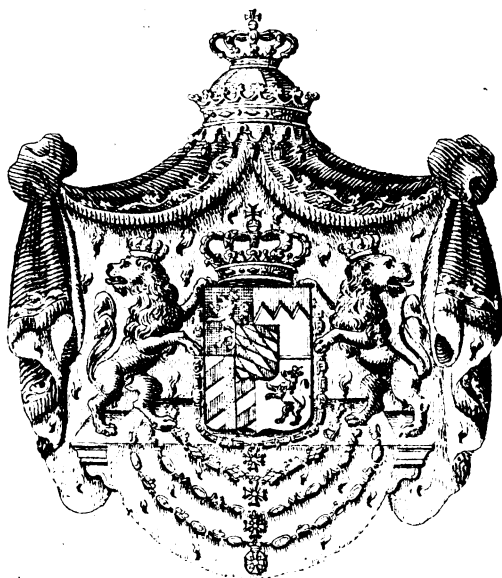


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Three *Physico-Theological*
DISCOURSES,
CONCERNING

- I. The Primitive CHAOS, and Creation of the World.
- II. The General DELUGE, its Causes and Effects.
- III. The Dissolution of the WORLD, and Future Conflagration.

Wherein are largely discussed,
The Production and Use of Mountains; the Original of Fountains, of Formed Stones, and Sea-Fishes Bones and Shells found in the Earth; the Effects of particular Floods, and Inundations of the Sea; the Eruptions of *Vulcano's*; the Nature and Causes of Earthquakes.

Also an Historical Account of those Two late remarkable Ones in *Jamaica* and *England*.

With PRACTICAL INFERENCES.

By *JOHN RAT*, late Fellow of the *Royal Society*.

The Third Edition, Illustrated with Copper-Plates, and much more Enlarged than the former Editions, from the Author's own MSS.

London: Printed for WILLIAM INNYS, at the Prince's Arms in S. Paul's Church-yard, 1713.

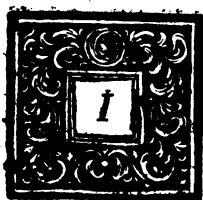
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TO THE
Most Reverend FATHER in GOD,

J O H N,
Lord Arch-Bishop of *Can-*
terbury, Primate of all
England, and *Metropoli*
tan.

M Y L O R D,



*I was no Interest
or Expectation of
mine, that induced
me to Dedicate this
Discourse to Your Grace. I
am not so well conceited of*
A 2 *my*

DEDICATION.

my own Performances, as to think it merits to be inscribed to so Great a Name, much less that I should Oblige Your Lordship, or indeed a far meaner Person, by such Inscription. My principal Motive was, that it would give me Opportunity of Congratulating with the Sober Part of this Nation, Your Advancement to the Archbishopial Dignity; and of acknowledging His Majesty's Wisdom in making Choice of so fit a Person to fill that Chair, endued with all Qualifications requisite for so high a Calling; so able and skilful a Pilot to govern the Church,

DEDICATION.

N

Church, and so prudent and faithful a Counsellor to serve Himself. But I will not enlarge in just Praises, lest I should incur the unjust Censure or Suspicion of Flattery. Give me leave only to add, what I may without Injury of Truth, and I think without Violation of Modesty, that Your Grace's Election hath the concurrent Approbation and Applause of all good Men that know You, or have had a true Character of You; which may serve to strengthen Your Hands in the Management and Administration of so difficult a Province, tho' You need no such Support,

A 3

as

DEDICATION.

as being sufficiently involved and armed by Your Vertues, and protected by the Almighty Power and Providence. Those that are Good and Wise are pleased and satisfied when Great Men are preferred to Great Places; and think it Pity that Persons of large and publick Spirits should be confined to narrow Spheres of Action, and want Field to exercise and employ those rich Talents and Abilities wherewith they are endowed, in doing all the Good they are thereby qualified and inclined to do.

M r

DEDICATION.

vii

MY LORD,

I am sensible that the Present I make You, is neither for Bulk nor Worth suitable to Your Person and Greatness; Yet I hope You will favourably accept it, being the best I have to offer: And my Boldness may pretend some Excuse from ancient Acquaintance, and from my Forwardness to embrace this Opportunity of professing my Name among those that Honour You, and of publishing myself,

MY LORD,

Your Grace's most devoted Servant,
and humble Orator,

JOHN RAY.

A 4

THE

17. POLYMERIZATION

The process of polymerization is a chemical reaction in which small molecules (monomers) combine to form a large molecule (polymer). This process is fundamental in the synthesis of plastics, rubbers, and other synthetic materials. The reaction is typically initiated by a catalyst or initiator, which starts the chain reaction. The monomers are usually small molecules with reactive groups that can form covalent bonds with each other. The resulting polymer is a long chain of repeating units, which can be linear, branched, or cross-linked. The properties of the polymer depend on the nature of the monomers and the conditions of the reaction. For example, the addition of cross-linking agents can lead to the formation of a three-dimensional network, which increases the strength and rigidity of the polymer. The process of polymerization is also influenced by factors such as temperature, pressure, and the concentration of the reactants. Understanding the mechanism of polymerization is crucial for the development of new materials and the optimization of existing processes.



THE PREFACE,

*Shewing what Alterations were made
in the Second Edition.*



HAVING altered the Method of this Treatise, and made considerable Additions to it, it may justly be expected that I should give some Account thereof to the Reader. In the Preface to the former Edition, I acquainted him, that I had taken notice of five Matters of Ancient Tradition. 1. That the World was formed out of a *Chaos*, by the Divine Wisdom and Power. 2. That there was an universal Flood of Waters, in which all Mankind perished, excepting some few, which were saved in an Ark or Ship. 3. That the World shall one day be destroyed by Fire. 4. That there is a Heaven

The Preface.

ven and a Hell, an *Elysium* and a *Tartarus*, the one to reward good Men, and the other to punish wicked; and both eternal. 5. That bloody Sacrifices were to be offered for the Expiation of Sin. And that of four of them I had occasion to treat in this Book; of two, that is to say, of the Dissolution of the World by Fire, and the Eternal State that was to succeed (in reference to Man) either in Heaven or Hell, more directly: Of the other two, *viz.* The Primitive *Chaos* and Creation, and the General Deluge, occasionally and by way of digression, at the Request of some Friends. But now this Treatise coming to a second Impression, I thought it more convenient to make these several Discourses upon these Particulars, substantial Parts of my Work, and to dispose them according to the Priority and Posteriority of their Subjects, in Order of Time, beginning with the Primitive *Chaos*.

CONCERNING these Traditions, it may be enquired what the Original of them was; Whether they were of Divine Revelation, or Humane Invention? In answer whereto,

As to the Second, That there was once a General Deluge, whereby this whole sublunary World was drown'd, and all Animals, both Man and Beast, destroyed, excepting only such as were preserved in an Ark;

Ark ; it being Matter of Fact, and seen and felt by *Noah*, and his Sons, there can be no Doubt of the Original of that.

THE First, concerning the *Chaos* and Creation of the World, if it were not antecedent than the Scripture, it is likely it had its Original from the first Chapter of *Genesis*, and the *Chaos* from the second Verse ; *And the Earth was without Form, and Void, and Darknes was upon the Face of the Deep.* But if it were more ancient, it must still, in all likelihood, be Divinely revealed, because Man being created last, and brought into a World already filled and furnished : And GOD being an Omnipotent, and also a Free Agent, who could as well have created the World in a Moment, or all together, as successively, it was impossible for Man by Reason to determine, which way He made choice of.

THE Third, concerning the future Dissolution and Destruction of the World by a General *Conflagration*, there being nothing in Nature that can demonstrate the Necessity of it : And a second Inundation and Submersion by Water, being in the Course of Nature a hundred times more probable, as I have shewn in the ensuing Discourses. And, therefore, we see GOD Almighty, to secure Man against the Apprehension and Dread of a second Deluge, made a Covenant

nant

The Preface.

stant with him, to give him a visible Sign in Confirmation of it, never to destroy the World so again. And the Ancients, who relate this Tradition, delivering it as an Oracle or Decree of Fate, *Ovid Metamorph. i. Esse quoque in fatis reminiscitur, affore tempus*, &c. was likewise probable of Divine Revelation.

THE Fourth, That there shall be a future State, wherein Men shall be punished or rewarded accordingly, as they have done ill or well in this Life, and that State Eternal: Tho' the First Part may be demonstrated from the Justice and Goodness of God, because there being an unequal Distribution of Good and Evil in this Life, there must be a Time to set things straight in another World; yet it being so difficult to Humane Reason, to reconcile the Eternity of Punishments with the Justice and Goodness of God, this Second Part of the Tradition had need be well back'd by Divine Authority, to make it credible and current among Men.

As for the Last, tho' I meddle not with it in this Treatise, yet I will take Leave to say so much concerning it, That, I think, those who held Sacrificing to have been a positive Command of God, and to have had its Original from Divine Institution, have the better Reason 'on their side. For that

that it is no eternal and indispensable Law of Nature, is clear, in that our Saviour abolished it. And many of the ancient Fathers look upon Sacrificing as so unreasonable a Service, that therefore they thought God commanded it not to the Primitive Patriarchs; and though He did command it to the Jews, yet He did it only in condescension to their Weakness, because they had been used to such Services, and also the Nations round about them, to restrain them from Idolatry, and Sacrificing to strange Gods. *Origen. Homil. 17. in Numer. Deus sicut per alium Prophetam dicit, non manducat carnes taurorum, nec sanguinem hircorum potat. Et etiam, ut alibi scriptum est, Quia non mandavi tibi de Sacrificiis vel victimis in die qua deduxi te de terra Ægypti. Sed Moyses hæc ad duritiem cordis eorum, pro consuetudine pessima qua imbuti fuerant in Ægypto, mandavit eis, ut qui abstinere se non possent ab immolando, Deo saltem & non Dæmoniis immolarent.* Other Quotations to this purpose may be seen in Dr. Outram *De Sacrificiis*. Indeed, it seems absurd to think or believe, that God should take any Pleasure in the Slaughter of innocent Beasts, or in the Fume and Nidor of burnt Flesh or Fat. Nor doth the Reason these Fathers alledge, of the Institution of Sacrifices, or Enjoining them to the Jews, satisfy, whatever Truth there

there may be in it : For it is clear, that the main End and Design of GOD in instituting of them, was for Types and Adumbrations of the great Sacrifice of CHRIST to be offered upon the Cross for the Expiation of Sin : And, consequently, it is probable, that those also that were offered by the Ancient Patriarchs before the Law, had their Original from some Divine Command or Revelation, and the like Reason of their Institution, in reference to CHRIST.

BUT to leave that, I have in this *Edition* removed one Subject of Apology, and added another ; so that there still remain as many things to be excused or pleaded for. They are,

FIRST, *Writing so much* ; for which some perchance may censure me. I am not ignorant, that Men as they are mutable, so they love Change, and affect Variety of Authors as well as Books. Satiety even of the best things is apt to creep upon us. He that writes much, let him write never so well, shall experience, that his last Books, though nothing inferiour to his first, will not find equal Acceptance. But for mine own part, tho' in general I may be thought to have written too much, yet is it but little that I have written relating to Divinity. It were a good Rule to be observed both by Writer and Reader, *Not how much, but how well.*

~~well~~. He that cannot write well, had better spare his Pains, and not write at all. Neither is he to be thought to write well, who though he hath some good things thin set and dispersed, yet encumbers and accloys the Reader with a deal of uselefs and impertinent Stuff. On the contrary, he that writes well, cannot write too much. For, as *Pliny the Younger* saith well, *Ut alia bona res, ita bonus Liber eò melior est quisque, quò major* : As other good Things, so a good Book ; the bigger it is, the better is it : Which holds as well of the Number as Magnitude of Books.

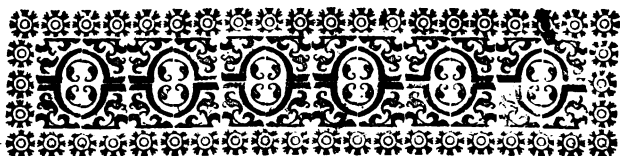
SECONDLY, *Being too hasty in huddling up, and tumbling out of Books* ; wherein, I confess, I cannot wholly acquit myself of Blame. I know well, that the longer a Book lies by me, the perfecter it becomes. Something occurs every Day in Reading or Thinking, either to add, or to correct and alter for the better. But should I deferr the *Edition* till the Work were absolutely perfect, I might wait all my Life-time, and leave it to be published by my Executors. Now my Age minding me of the Approach of Death ; and posthumous Pieces generally proving inferior to those put out by the Authors in their Life-time, I need no other Excuse for my Haste in publishing what I write. Yet I shall farther add, in Extenuation of the Fault,

it

if it be one, that however hasty and precipitate I am in writing, my Books are but small, so that if they be worthless, the Purchase is not great, nor the Expence of Time, wasted in the Perusal of them, very considerable. Yet, is not the Worth of a Book always answerable to its Bulk. But on the contrary, Μέγα βιβλίον is usually esteemed ἴσον τῷ μεγάλῳ κακῷ; for, ὅτι ἐν τῷ μεγάλῳ τὸ εὖ, ἀλλ' ἐν τῷ εὖ τὸ μέγα.

THIRDLY, The last thing for which I had need to apologize, is the Rendring the former *Edition* of this Treatise worthless, by making large Additions to this latter: In Excuse whereof I have no more to say, than I have already written in an *Advertisement* to the *Reader*, premised to my Discourse concerning the *Wisdom of God*; to which, therefore, I referr those who desire Satisfaction in this Particular.





TO THE READER.



EST the Additions made to this Third Edition of these Discourses should lie under any Suspicion of being spurious, by reason they have lain above seven Years unpublished after their justly celebrated Author's Death; I think it necessary to assure the Reader, that they were written in Mr. Ray's own Hand, and (as I find by his Papers) towards the latter End of the Year 1703, or Beginning of 1704: And in April, 1704, they were transmitted to his Booksellers, who had been very importunate for them, and hasty for a Third Edition; the former Impression being sold off, and the Book
b much

much called for, as they say in their Letters. But amongst other Hindrances, that which chiefly retarded the intended Impression of the Book, was an ill State of Health befalling the principal Bookseller, which necessitated him to retire often into the Country from his Business, which was succeeded by his Death, and some time after by the Death of the other Partner also. By which means the Affairs of the Booksellers, who had the Right of the Copy, being in some Confusion, this Third Edition could not be attended unto till of late, when the Right of this and other of Mr. Ray's Copies came into another's Hands.

As for the Reasons inducing our excellent Author to make Additions to this, and other of his justly admired Pieces, he had (besides the Solicitations of the Booksellers) the earnest Requests of some of his most judicious and best Friends. And considering that his Additions tended to the greater Perfection of his Books, there is no great Reason for the Purchasers of the former Editions to complain of Injury, especially where

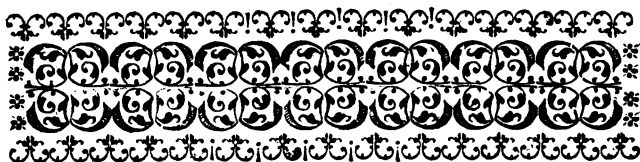
where the Purchase was but small. But for a farther Answer, I shall referr the Reader (as our Author in his Preface doth) to the Advertisement in his Wisdom of GOD. And that I might do what lies in me to obviate Complaints, and be serviceable, as far as I could, to the Purchaser's Profit, I have noted the Additions made to this Third Impression, that they that bought the former Edition may transcribe them, if they think it worth their while.

WILLIAM DERHAM.



b 2

THE



T H E
A D D I T I O N S
I N T H I S
Third Impression.

PAG. 10. *From* In this manner, *to* illustrate it.

Pag. 12. *From* When I say; *to* Mountain that way, p. 13.

Pag. 41. As for the Wells, *to* improbable.

Pag. 58. But notwithstanding, *to* insist upon it, p. 59.

Pag. 59. I think I have, *to* I am less inclinable.

Pag. 62. The first in, *to* in the 5th Chap.

Pag. 65. Consonant to the preceding Words of *Abydenus*.

Pag. 67. *Pliny* saith of the City of *Joppa*, that it was built before the Flood.

Pag. 70. To this may be replied, *to* the lightest, p. 71.

Pag. 73. Natural; and that no ordinary, *to* Heavens were opened.

Pag. 74. After no inconsiderable thing, *seven Lines of the former Edition are left out.*

†

Ibid.

Ibid. From Cloud, who knows? the following Part of the Paragraph is left out, and in its room is set, That the Ocean, to Scriptures, p. 75.

Pag. 79. *Madidis Notus alis.* Ovid. Metam.

Pag. 84. But to put, to p. 101, 102.

Pag. 89. Dr. Hook's, to believe there are not.

Pag. 114. That Rains, to the Bottom of the Page.

Pag. 115. The Fruitfulness, to of Nile.

Q. Whether this Paragraph be not misplaced?

Pag. 116. But because (as I said before) to touch the Ground. After which, three Paragraphs in p. 117, 118, 119, 120. of the former Edition, are left out.

Pag. 118. I shall leave the Reader to compare the Alteration made, from This Hypothesis, to highest Mountains, with p. 122. of the former Edition, If any object.

Ibid. (as credibly Authors, to those of Mexico) p. 119.

Pag. 120. But because, to former Account.

Pag. 126. Dr. Woodward, to Deluge.

Pag. 129. Another the like Bed, to so far Mr. Brewer, p. 132.

Pag. 138. This Argument is, to living Shark, p. 139.

Pag. 140. as Signor Agostino, to from them both.

Pag. 143. Two farther Arguments, to out of Agostino Scilla, p. 145.

Pag. 146. and 13 days, to the Bottom of the Page.

Pag. 149. This to me, I confess, is at present unaccountable.

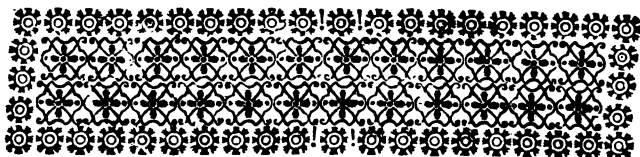
Pag. 155. Upon farther Consideration, to Species under it.

Pag. 156. To this may be answered, to Islands of Scotland, p. 157.

Pag. 165. Dr. Woodward, to Bed or Stratum, p. 167.

- Pag. 172.* This Conjecture, *to* thence might.
- Pag. 174.* According to my Hope, *to* with their Fellows, p. 204.
- Pag. 208.* To which may be added, *to* Working of the Sea, p. 209.
- Pag. 211.* Notwithstanding these, *to* selves beholding it, p. 212.
- Pag. 215.* Moreover, *to* thereabout.
- Pag. 218.* Notwithstanding all these, *to the End of the Page* 226.
- Pag. 228.* Here I might take, *to* I have digressed, p. 241.
- Pag. 276.* For, 1. It could, *to* a Flame.
- Pag. 291.* In this Conjecture, *to* discoursed at large, p. 294.
- Pag. 443.* Now that it is unjust, *to* enforce Obedience to his Laws, p. 446.
- And in the same Place, in the former Edition, p. 395.* from How can it be just, *to the End of the Paragraph, is left out.*
- Pag. 450.* Instead of punishing an Offender, it is having an Offender punished by the Magistrate, or by God.
- Ibid.* He hath not permitted, *to* I will repay.
- Ibid.* After Veracity? *compare the Alterations, viz. what is left out in the former, and added in this Edition, from Veracity, to digressed,* p. 452.
- Pag. 452.* I shall add farther, *to* groundlessly imagine, p. 453. *Compare also the Variation from the former Edition.*
- Pag. 453.* After go on in Sin, *see what is left out of what is in the former Edition,* p. 402, 403.





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A

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per multas noviter inventas & descriptas complectens.
Tomi duo. Fol. 1686.

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Sixth Edition. 1713.

Three Physico-Theological Discourses, &c. *With Practical Inse-*
rences. 1713.

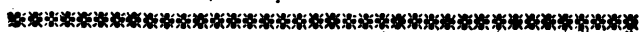
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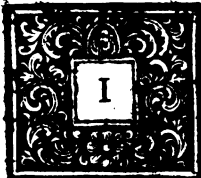
DIS-



DISCOURSE I.



Of the Primitive CHAOS and Creation of the World.

N the First Edition of this Treatise, this Discourse concerning the *Primitive Chaos* and *Creation* of the World, and that other concerning the *Destruction* thereof by the Waters of the *General Deluge*, in the Days of *Noah*, were brought in by way of Digression ; because I designed not at first to treat of them, but only of the *Conflagration* or *Dissolution* of the *World* by *Fire* ; but was afterwards, when I had made a considerable Progress in the *Dissolution*, at the Instance of some Friends, because of their Relation to my Subject, prevailed upon to say something of them. But now that I am at Liberty so to do, I shall not handle them any more by the by, but make
B them

Of the Chaos

them substantial Parts of my Book, and dispose them, as is most natural, according to their Priority and Posteriority in Order of Time, beginning with the *Chaos* and *Creation*.

C H A P. I.

Testimonies of the Ancient Heathen Writers concerning the Chaos, and what they meant by it.



IT was an ancient Tradition among the Heathen, that the World was created out of a *Chaos*.

FIRST of all the ancient Greek Poet *Hesiod*, who may contend for Antiquity with *Homer* himself, makes mention of it in his *Theogonia*, not far from the Beginning, in these Words :

Ἦτοι μὲν πρῶτις αὖ Χάος γέενετ'.

First of all there was a Chaos. And a few Verses after, speaking of the immediate Production or Offspring of the *Chaos*, he saith,

Ἐκ Χάος δ' Ἐρεβός τε, μέλαινά τε Νύξ ἐγένοντο.

From Chaos proceeded Hell, and Night, [or Darkness] which seems to have its Foundation or Occasion from the second Verse of the

the first Chapter of *Genesis*; And the Earth was without Form, and void; and Darkness was upon the Face of the Deep. Of this Testimony of *Hesiod*, *Lactantius* takes notice, and censures it, in the first Book of his *Institutions*, cap. 5. *Hesiodus non à Deo conditore sumens exordium, sed à Chao, quod est rudis inordinatæque materiæ confusæ congeries.* *Hesiod* not taking his Beginning from God the Creator of all Things, but from the Chaos, which is a rude and inordinate Heap of confused Matter. And so *Ovid* describes it in the Beginning of his *Metamorphosis*;

*Quem dixere Chaos, rudis indigestaque moles,
Nec quicquam nisi pondus iners congestaque
eodem
Non bene junctarum discordia semina rerum.*

That is,
One Face had Nature, which they Chaos nam'd,
An undigested Lump, a barren Load,
Where jarring Seeds of things ill-join'd abode.

Others of the Ancients have also made mention of the Chaos, as *Aristophanes* in *Avibus*,

Χάος ἦν καὶ Νύξ, Ἐρεβός τε μέλαν πρῶτον, &c.

And *Lucian* in the Beginning of his first Book,

Antiquum repetent iterum Chaos omnia, &c.

Of the Formation of all the Parts of the World out of this *Chaos*, *Ovid*, in the place

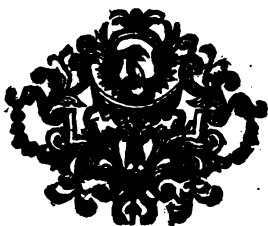
fore-quoted, gives us a full and particular Description ; and *Euripides* before him a brief one,

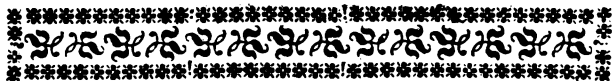
Ὁ δ' Οὐρανὸς καὶ γαῖά τ' ἦν μορφὴ μία,
Ἐπεὶ δ' ἐχωρίσθησαν ἀλλήλων, δες.

The Heaven and Earth were at first of one Form ; but after they were separated, the Earth brought forth Trees, Birds, Beasts, Fishes, and Mankind.

THE like Account also the ancient Philosopher *Anaxagoras* gives of the Creation of the World, beginning his Philosophy thus ; Πάντα χρήμκτα ἦν ὁμῶς· εἴτα Νῆς ἐλθὼν αὐτὰ διεκόσμησε· that is, *All things (at first) were together, or mingled and confused, then Mind supervening disposed them in a beautiful Order.*

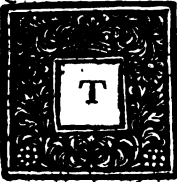
THAT which I chiefly dislike in this Opinion of theirs, is, that they make no mention of the Creation of this *Chaos*, but seem to look upon it as self-existent and introduced.





C H A P. II.

That the Creation of the World out of a Chaos, is not repugnant to the Holy Scripture.

 HIS Opinion of a *Chaos*, if soberly understood, not as self-existent and improduced, but in the first place created by G O D, and preceding other Beings, which were made out of it, is not, so far as I can discern, any way repugnant to the Holy Scripture, but on the contrary rather consonant and agreeable thereto. For *Moses*, in the History and Description of the Creation, in the first Chapter of *Genesis*, saith, not that G O D created all things in an instant in their full State and Perfection, but that He proceeded gradually and in Order, from more imperfect to more perfect Beings, first beginning with the Earth, that is, the Terraqueous Globe, which was made *tohu vabohu*, without Form, and void, the Waters covering the Face of the Land, which were afterwards separated from the Land, and gathered together into one place. Then He created out of the Land and Water, first Plants, and then Animals, Fishes, Birds, Beasts, in Order, and last of all formed the Body of Man of the Dust of the Earth.

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AND whereas there is no particular mention made of the Creation of Metals, Minerals, and other Fossils, they must be comprehended in the Word *Earth*, as the Water itself also is in the second Verse of this first Chapter.

IT seems, therefore, to me consonant to the Scripture, That God Almighty did at first create the Earth or Terraqueous Globe, containing in itself the Principles of all simple inanimate Bodies, or the minute and naturally indivisible Particles of which they were compounded, of various but a determinate Number of Figures, and perchance of different Magnitudes; and these variously and confusedly commixed, as though they had been carelessly shaken and shuffled together; yet not so, but that there was Order observed by the most Wise Creator in the Disposition of them. And not only so, but that the same Omnipotent Deity did create also the Seeds or Seminal Principles of all Animate Bodies, both Vegetative and Sensitive; and dispers'd them, at least the Vegetative, all over the superficial Part of the Earth and Water. And the Notion of such an Earth as this is, the Primitive Patriarchs of the World delivered to their Posterity, who, by Degrees annexing something of Fabulous to it, imposed upon it the Name of *Chaos*.

THE next Work of the Divine Power and Wisdom, was the Separation of the Water from

from the dry Land, and Raising up of the Mountains, of which I shall treat more particularly in the next Chapter.

To which follows the Giving to both Elements a Power of hatching, as I may so say, or quickening and bringing to Perfection the Seeds they contained; first the more imperfect, as Herbs and Trees; then the more perfect, Fish, Fowl, Four-footed Beasts, and creeping Things or Insects. Which may be the Meaning of those Commands of GOD, which were operative and effectual, communicating to the Earth and Water a Power to produce what He commanded them, *Gen. i. 11. Let the Earth bring forth Grass, &c. and v. 20. Let the Waters bring forth abundantly the moving Creature that hath Life, and Fowl that may fly above the Earth, &c. And v. 24. Let the Earth bring forth the living Creature after his Kind, Cattle and creeping thing, and Beast of the Earth after his Kind.*

So the Earth was at first cloathed with all Sorts of Herbs and Trees; and both Earth and Water furnished with Inhabitants. And this the Ancients understood by their *διανοήματα*.

BUT whether out of præ-existing Seeds, as I suppose, or not, certain it is, that GOD at that time did give an extraordinary and miraculous Power to the Land and Water, of producing Vegetables and Animals; and after there were as many of every kind brought

forth, as there were Seeds created at first ; or as many as it seemed good to the Divine Creator to produce without Seed ; there remained no farther Ability in those Elements to bring forth any more ; but all the succeeding owe their Original to Seed ; God having given to every *Species* a Power to generate or propagate its Like.



C H A P. III.

Of the Separating the Land and Water, and Raising up the Mountains.

SUPPOSING that GOD Almighty did at first create the Terrestrial Globe, partly of solid and more ponderous, partly of fluid and lighter Parts ; the solid and ponderous must needs naturally subside, the fluid and lighter get above. Now, that there were such different Parts created, is clear, and therefore it is reasonable to think, that the Waters at first should stand above and cover the Earth : And that they did so, seems evident to me from the Testimony of the Scripture. For, in the History of the Creation, in the first Chapter of *Genesis*, ver. 2. it is said, That *the Spirit of God moved upon the Face of the Waters*, intimating that the Waters were uppermost. And God said, ver. 9. *let the Waters under the Heaven be gathered together*

together into one place, and let the dry Land appear. Whence, I think, it is manifest to any unprejudiced Reader, That before that time the Land was covered with Water: Especially, if we add the Testimony of the Holy Psalmist, *Psalms civ. ver. 6, and 9:* which is as it were a Comment upon this Place of *Genesis*, where, speaking of the Earth at the Creation, he saith, *Thou coverdest it with the Deep as with a Garment; the Waters stood above the Mountains* and, *ver. 9. That they turn not again to cover the Earth.* And that this Gathering together of Waters was not into any subterraneous Abyss, seems likewise clear from the Text: For it is said, That *GOD* called this Collection of Waters *Seas*, as if it had been on purpose to prevent such a Mistake.

Whether this Separation of the Land and Water, and Gathering the Waters together into one Place, were done by the immediate Application and Agency of *God's Almighty Power*, or by the Intervention and Instrumentality of Second Causes, I cannot determine. It might possibly be effected by the same Causes that Earthquakes are, *viz.* subterraneous Fires and *Flatus's*. We see what incredible Effects the Accension of Gunpowder hath: It rends Rocks, and blows up the most ponderous and solid Walls, Towers, and Edifices, so that its Force is almost irresistible. Why then might not such a proportionable

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tionable Quantity of such Materials set on fire together, raise up the Mountains themselves, how great and ponderous soever they be, yea the whole Superficies of the dry Land (for it must all be elevated) above the Waters ? And truly to me the Psalmist seems to intimate this Cause, *Psalm civ, 7, For, after he had said, The Waters stood above the Mountains ; he adds, At Thy Rebuke they fled, at the Voice of Thy Thunder they hasted away.* Now, we know that an Earthquake is but a subterraneous Thunder, and then immediately follows, *The Mountains ascend, the Valleys descend, &c.* In this Manner of raising up the dry Land at first, and casting off the Waters, I was well pleased to find the Right Reverend Father in God, *Simon*, Lord Bishop of *Ely*, to agree with me in his excellent Commentary upon *Genesis*, cap. i. ver. 9. ‘ This, saith he, we may conceive to have ‘ been done by such Particles of Fire as were ‘ left in the Bowels of the Earth, whereby such ‘ Nitrosulphureous Vapours were kindled, as ‘ made an Earthquake, which both lifted up ‘ the Earth, and made Receptacles for the Waters to run into ; as the Psalmist (otherwise ‘ I should not venture to mention this) seems ‘ in the forementioned Place to illustrate it. If there might be a high Hill raised up near the City *Træzen*, out of a plain Field, by the Force of a subterraneous Fire or *Flatus*, as *Ovid* tells us :

Est

*Est prope Pitthæam tumulus Træzena sine ullis
Arduus arboribus, quondam planissima campi
Area, nunc tumulus: nam (res horrenda relatu)
Vis fera ventorum, cæcis inclusa cavernis,
Expirare aliqua cupiens, luctatâque frustra
Liberiore frui cælo, cum carcere rima
Nulla fuit toto, nec pervia flatibus esset,
Extentam tumefecit humum, ceu spiritus oris
Tendere vesicam solet, aut derepta bicornis
Terga capri; tumor ille loci permansit, & alti
Collis habet speciem, longoque induruit ævo:*

Ov. Me-
tamorph.
lib. 15.

*A Hill by Pitthæan Træzen mounts, uncrown'd
With Sylvan 'Shades, which once was level
Ground,*

*For furious Winds (a Story to admire)
Pent in blind Caverns, struggling to expire;
And vainly seeking to enjoy th' Extent
Of freer Air, the Prison wanting Vent,
Puffs up the hollow Earth extended so,
As when with swelling Breath we Bladders
blow:*

*The Tumour of the Place remained still,
In time grown solid, like a lofty Hill:*

A parallel Instance hereto we have of later Date, of a Hill not far from *Puzzuolo* [*Puteoli*] beside the Gulf of *Baia*, which I myself have view'd and been upon. It is by the Natives call'd *Monte di cenere*, and was raised by an Earthquake, Sept. 29. 1538. of about one hundred Foot perpendicular Altitude, though

Of the Chaos

though some make it much higher: According to *Stephanus Pigbius*, it is a Mile Ascent to the Top, and four Miles round at the Foot; We indeed judged it not near so great. The People say it bears nothing; nothing of any Use or Profit, I suppose, they mean: Else I am sure, there grows *Heath*, *Myrtle*, *Mastick-Tree*, and other Shrubs upon it. It is a spongy kind of Earth, and makes a great Sound under a Man's Feet that stamps upon it. The same Earthquake threw up so much Earth, Stones and Ashes, as quite filled up the *lacus Lucrinus*, so that there is nothing left of it now, but a fenny Meadow. When I say, that this Mountain was raised by an Earthquake, I do not mean, that the meer Succussion, or Shaking of the Earth, raised up the Mountain; but that the same Cause which shook the Earth, that is, subterraneous Fire, cast up the Materials which raised the Mountain, and of which it doth consist, that is, Stones, Cinders, Earth, and Ashes. Indeed, under the Word *Earthquake*, in this Work, I comprehend the Concomitants and Consequents of an Earthquake, and the efficient Cause of it; which is a subterraneous Fire, as I have expressed myself, *pag. 10. line 8. of the First Edition.*

NETHER, by the Elevation of Mountains, do I mean, that they were all heaved up, as it were by a *Flatus*, but only such, where the enclosed Fire was not of Force sufficient
to

to make its way out, or found not *Spiracula* to vent itself. Otherwhere, where it was strong enough to rend the superincumbent Mass of Earth, or found some Rifts or *Spiracula* to break out by, there it issued out with great Force, and threw up abundance of Stones, Ashes, and Earth, and so raised up a Mountain that way.

If such Hills, I say, as these, may be, and have been elevated by subterraneous Wild-fire, *Flatus*, or Earthquakes, *si parvis liceat componere magna*, if we may compare great things with small, why might not the greatest and highest Mountains in the World be raised up in like manner by a subterraneous *Flatus* or Wild-fire, of Quantity and Force sufficient to work such an Effect; that is, that bears as great a Proportion to the superincumbent Weight and Bulk to be elevated, as those under these smaller Hills did to theirs?

BUT we cannot doubt this may be done, when we are well assured that the like hath been done. For the greatest and highest Ridge of Mountains in the World, the *Andes* of *Peru*, have been, for some hundreds of Leagues in Length, violently shaken, and many Alterations made therein by an Earthquake that happened in the Year 1646. mentioned by *Kircher* in his *Arca Noë*, from the Letters of the Jesuites. And *Pliny* tells us, of his own knowledge, that the Alps and Appennine have often been shaken with Earthquakes :

quakes: *Exploratum est mihi Alpes Appenninūque sæpius tremuisse*, lib. 2. cap. 80. Nay, more than all this, we read, that in the time of the Emperor *Valentinian* the First, there was an Earthquake that shook all the known World. *Whilst this Innovator* [that is, *Procopius*] was yet alive, (saith *Amm. Marcellinus*, lib. 26. cap. 14.) *Horrendi tremores per omnem orbis ambitum grassati sunt subito, quales nec fabulæ, nec veridicæ nobis antiquitates exponunt. Paulò enim post lucis exortum, densitate prævia fulgurum acrius vibratorum tremefacta concutitur omnis terreni stabilitas ponderis, mareque dispulsum retrò fluctibus evolutis abscessit, ut resecta voragine profundorum species natantium multiformes limo cernerentur hærentes, valliūmque vastitates & montium, ut opinari dabatur, suspicerent radios solis quos primigenia rerum sub immensis gurgitibus amandavit, &c.* That is, Horrid Earthquakes suddenly raged all the World over; the like whereto, neither Fables nor true Antiquities ever acquaint us with, or make mention of. For soon after Break of Day, redoubled, smart, and violent Flashes of Lightning preceding, the stable and ponderous Mass of the whole Earth was shaken, and made to tremble; and the Sea, with revolved Waves, was driven backwards, and forced so far to recede, that the Bottom of the great Deeps and Gulfs being discovered, multiform Species of Fishes, forsaken by the Water, were seen

seen lying on the Mud; and those vast Valleys and Mountains, which the primigenial Nature had sunk deep, and concealed under immense Waters, (as we had reason to think) saw the Sun-beams. Wherefore, many Ships resting upon the dry Ground, the Mariners wandering carelessly up and down through the small Reliques of the Waters, that they might gather up Fishes, and other things, with their Hands; the Sea-Waves being, as it were, grieved with their Repulse, rise up again, and making their way backward through the fervid Shallows, violently dashing against the Islands and extended Shores of the Continents, threw down, and levelled innumerable Edifices in Cities, and where else they were found. Where, see more of the Effects of it. Of this Earthquake we find mention also in *Zosimus* and *Orosius*.

If this Story be true, as certainly it is, we have no reason to doubt of the Possibility of the dry Land being thus raised at first by subterraneous Fire. And with us agrees the learned *Thomas Lydyat*, in his *Philosophical Disquisition concerning the Origine of Fountains, &c.* being of Opinion not only that it might be so, but that it was so. I shall give you his own Words, *Ubi aliud quoque summæ admirationis plenum Terræmôtus atque Ignis subterranei effectum notandum venit, montium sci. generatio.* And then having mentioned the raising up Islands in the
Sea

Sea by subterraneous Fires, he proceeds thus, *Quomodo etiam omnes montes qui aspi- am sunt, una cum ipsis terris Continentibus (que nihil aliud sunt quam sparsi in Oceano majores montes sive insulae) in mundi primordiis, (quando nimirum Ignis de quo loquimur, in terra visceribus à potentissimo mundi Conditor accensus est) extitisse maximè sit verisimile; mari in cava loca recedente, & terrestribus Animalibus (eiusdem Divini numinis sapientissimo consilio) habitandi locum relin- quente.* That is, After which Manner also all the Mountains in the World, together with the Continents themselves, (which are nothing else but great Mountains or Islands scattered in the Ocean) in the beginning of the World, when the Fire of which we speak was first kindled in the Bowels of the Earth by the Almighty Creator, were (as it is most highly probable) originally raised up; the Sea receding into the Cavities and depressed Places, and by the most wise Counsel of the Supreme Deity, leaving Room for Terrestrial Animals to inhabit. Than which nothing can be said more consonant to what we have written: And I was highly pleased and satisfied to find such Philosophy in so learned and judicious a Writer.

AND in Confirmation of this Doctrine, Strabo himself, though he had not, nor could have any Knowledge at all of the prodigious Effects of Gunpowder, yet makes no Difficulty to affirm the Possibility of raising up
as

as well the Continents and Mountains, as the Islands, by Earthquakes and subterraneous Fires; toward the latter end of the first Book of his Geography, discoursing thus : Καὶ γὰρ σεισμοὶ, καὶ ἀναφυσήματα, καὶ ἀποιδήσεις τῆς ὑφ' αὐτῆς γῆς μετεωρίζουσι καὶ τὴν θάλασσαν. Οὐ γὰρ μύδεσι μὲν ἀνενεχθῆναι δύνανται, καὶ μικραὶ νῆσοι, μεγάλαι δ' ἔ· ἐδὲ νῆσοι μὲν, ἤπειροι δ' ἔ· And a little after, Καὶ τὴν Σικελίαν ἐδὲν τι μᾶλλον ἀπορρώγα τῆς Ἰταλίας εἰκάζοι τις, ἂν, ἢ ἀναβληθεῖσαν ὑπὸ τῇ Αἰτναίῃ πυρὸς ἐν βύθῳ συμμεῖναι. That is, For Earthquakes and Eruptions of Flatus [Blasts] or sudden Tumors of the Submarine Earth, or Bottom of the Sea, may swell and elevate the Sea; so that not only small Lumps or Masses of Matter, but even Islands may be raised up in the midst of it. Neither if small Islands can be raised, may not great ones too; neither may Islands be heaved up, and not Continents as well. And Sicily may as well be thought to have been thrown up out of the Deep by the Force of the Ætnæan Fire, and sticking together to have continued above Water, as to have been a Piece broken off from Italy. And the like may be said of the Islands of Lipara and Pithecusæ.

OF the Possibility of doing it we need not doubt, when we have sufficient Proof of the thing done in lesser Islands thus heaved up in the midst of the Sea, by submarine Fires. Strabo, lib. 1. Ἀνὰ μέσον γὰρ Θήρας καὶ Θηρασίας ἐκπεσῆσαι φλόγες ἐκ τῆ πελάγους ἐφ' ἡμέρας

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ρας τέσσαρας, ὥς πᾶσαν ζεῖν καὶ φλέγεσθαι τὴν θάλασσαν, ἀνεφύσσαν κατ' ὀλίγον ἐξαιεσμένην ὡς αὖν ὀργανικῶς καὶ σπιντεθειμένην ἐν μύδρων νῆσον, δώδεκα σταδίῳ τὴν περίμετρον. That is, *Between Thera and Therasia Flames issuing out of the Sea for four Days, (so that the whole Sea boiled and burned) blew up by little and little, as if it had been raised by Machines, and composed of great Lumps or Masses, an Island of Twelve Furlongs Circumference.*

AND Pliny tells us, that the Island *Hiera*, near *Italy*, in the Time of the Social War, together with the Sea itself, did burn for several Days. His Words are, *In medio Mari Hiera insula juxta Italiam cum ipso Mari arsit per aliquot dies.*

AND Strabo, lib. i. reports, That about *Methone*, in the Bay of *Hermione*, there was Earth raised, and as it were blown up to the Height of seven Furlongs by a fiery Breath or Exhalation, which by Day-time was unaccessible by reason of Heat and sulphureous Stench, but smelling sweet by Night, and shining so as to be seen afar off, likewise casting such a Heat, as to cause the Sea to boil for five Furlongs, and to render it troubled for the Space of twenty; raising up therein a Baich or Bank of Stones as big as Towers.

THESE Instances I alledge, principally because they seem to demonstrate a Possibility of the Accension of Fire in the Earth when it was wholly covered with Water, and had
no

no Entercourse or Communion with the superiour or external Air; which is the main and most material Objection against the Elevation of the dry Land at the beginning by subterraneous Fires.

Y O U will say, If the Mountains be thus heaved, or else cast up, by subterraneous Fires, the Earth must needs be hollow all underneath them, and there must be vast Dens and Caverns dispers'd throughout them.

I ANSWER, 'Tis true indeed, so there are; as may undeniably be proved by Instances. For the new Mountain we mentioned at *Puteoli*, that was thus raised, being of a Mile steep Ascent, and four Miles round at the Foot, a proportionable Cavity must be left in the Earth underneath: And the Mountain *Ætna*, at the last Eructation alone, having disgorged out of its Bowels so great a Flood of melted Materials, as if spread at the Depth and Breadth of three Foot, might reach four times round the whole Circuit of the *Terraqueous Globe*, there must likewise an answerable Vault be left within. You will demand, How then comes it to pass, that they stand so firm, and do not founder and fall in, after so many Ages? I answer, that they may stand, appears by the foresaid new-raised Mountain. For notwithstanding the Cavity under it, it hath stood firm and staunch, without the least Sinking or Subsidency, for above an hundred and fifty Years; neither is

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there any great Sinking or Falling in at *Ætna* itself; at least in no degree answerable to its ejected Matter. This Assertion is confirmed by the unanimous Vote and Testimony of all Writers, Ancient and Modern, who have handled this Subject. But *Alphonfus Borellus* supposes them not to have duly considered the Matter, and calculated the Quantity of the ejected Materials, and the Bulk of the Mountain, and compared them together; but to have been carried away by the Prejudices and Persuasions of the People; who looking upon the Top of the Mountain at a Distance, think it but a small thing in Comparison of the ejected Sand and Ashes that cover'd whole Countries; and those vast Rivers of liquid Stones, and other Ingredients, that ran down so many Miles, whereas he, by a moderate Computation, found out that the Total of what the Mountain disgorged at the last Eruption, amounted not (as I remember) to the fourteen thousandth Part of the Solidity of the whole Mountain. The reason is the Strength and Firmness of their Vulture and Pillars, sufficient to support the superincumbent Weight. And yet in some Places there are Sinkings and Fallings in, which have afterwards become Valleys, or Pools of Water. But as for the Cavities that are lower than the *Superficies* of the Ocean, the Water, where it could insinuate and make its Way, hath filled them up to that Height. I say, where it could

could make its Way, for that there are many empty Cavities even under the Sea itself, appears by the shaking and heating too of the very Water of the Sea in some Places in Earthquakes, and raising up the Borders or Skirts of it, so as to drive the Water a great way back, and the raising up new Islands in the middle of the Sea ; as *Delos* and *Rhodes*, and *Anaphe*, and *Nea*, and *Alone*, and *Hiera*, and *Thera*, mentioned by *Pliny*, Hist. lib. 2. c. 87. and *Thia* in his own time ; and *Therasia* in the *Ægean* in *Seneca's* time, which was heaved up in the Sight of many Mariners then present and looking on.

I AM not ignorant, that the learned Man I lately quoted, I mean *Alph. Borellus*, in his Book *De Incendiis Ætnæ*, is of Opinion, that the middle Part, or, as he calls it, the Kernel of that Mountain, is firm and solid, without any great Caverns or Vacuities, and that all those Vaults and Cavities in which the Fire rages, are near the Superficial or Cortical Part : And derides those who fancy that *Ætna*, the *Æolian* Islands, *Lipara*, *Strongyle*, &c. and *Vesuvius*, do communicate by subterraneous Channels and Passages running under the Bottom of the Sea. But saving the Respect due to him for his Learning and Ingenuity, there is good Authority on their Side ; and our Ratiocinations against the Possibility of such a thing must give place to the clear Proof of Matter of Fact. *Julius Ethnicus*,

an ancient Writer, quoted by *Ludovicus Vives*, in his Annotations upon *S. Augustin*, *De Civitate Dei*, gives us this Relation; *Marco Æmilio, Lucio Aurelio Consulibus, Ætna mons terramotu Ignem super verticem latè diffudit, & ad Insulam Liparam mare efferbuit, & quibusdam adustis navibus vapore plerosque navaleis exanimavit: Piscium vim magnam exanimem disperfit, quos Liparenfes avidius epulis adpetentis contaminatione ventris consumpti sunt, ita ut novâ pestilentia vastarentur insule.* That is, *Marcus Æmilius, and Lucius Aurelius, being Consuls, Mount Ætna being shaken by an Earthquake, cast forth and scattered Fire from its Top far and wide. At which time, the Sea, at the Island of Lipara, was boiling hot, and some Ships being burnt, most of the Seamen were stifled with the Vapour: Besides, it dispersed abroad a power of dead Fish, which the Liparenfians greedily gathering up and eating, were consumed with a contagious Disease in their Bellies; so that the Islands were wasted with a new sort of Pestilence.* And *Father Kircher the Jesuite*, in the Preface to his *Mundus Subterraneus*, giving a Relation of an Earthquake which shook a great Part of *Calabria*, and made notable Devastations there, which himself saw, and was, in *Anno 1638.* clearly demonstrates, that *Ætna, Stromboli, and the Mountains of Calabria,* do communicate by Vaults and Caverns passing under the Bottom of the Sea.

I shall

I shall insert but one Passage out of him, referring the Reader to the fore-quoted Preface for the rest. *Hicce calamitatibus* (saith he) *dum jactamur, ego curiosus intuitus Strongylum, 60 fere milliarium intercapedine dissitum, illum insolito modo furere notavi, &c.* i. e. While we were tost with these Calamities, I beholding curiously the Island Stromboli, about 60 Miles distant, observed it to rage after an unusual manner, for it appeared all filled with Fire in such Plenty, that it seemed to cast forth Mountains of Flame; a Spectacle horrid to behold, and formidable to the most undaunted Spirit. In the mean time, there was a certain Sound perceived as it were of Thunder, but by reason of the great Distance from whence it came, somewhat obscure, which by degrees proceeding forward in the subterraneous Conduits, grew greater and greater, till it came to the Place just underneath us, [they were at Lopez by the Sea] where it shook the Earth with such a Roaring, or Murmur and Fury, that being not able to stand any longer upon our Legs, we were forced, to support ourselves, to catch hold upon any Shrub or Twig that was near us, lest our Limbs should be put out of Joint by too much Shaking and Concussion. At which time happened a thing worthy of immortal and eternal Memory, viz. the Subversion of the famous Town of S. Eufemia; which he goes about to relate. As for Vesuvius, if that be not hollow down to

the very Roots and Foundations of it, how comes it to pass, that at the Times of its De-flagurations it should vomit out such Floods of boiling Waters? as, if we had not read of them in Histories, and been told so by our Guide when we ascended that Mountain, we must needs have perceived ourselves, by the mighty Gulls and Channels in the Sides thereof, it being of itself near the Top so spongy and dry, that it is more likely to imbibe than to cast off much Rain in the Winter-time. And again, what causes the Sea to recede at those Times, and that to so great a Distance, that the Gallies have been laid dry in the very Haven of *Naples*?

HOW BE IT, I cannot positively assert the Mountains thus to have been raised. But yet, whether without Means, or by whatsoever Means it were, a Receptacle for the Waters was prepared, and the dry Land and Mountains elevated, so as to cast off the Waters, on the third Day, and which is wonderful, the Cavities made to receive the Waters, and the whole *terra firma*, or dry Land, with its Mountains, were so proportioned one to the other, as that the one was as much depressed below the Shores, as the other was elevated above them. And, as if the one had been taken out of the other, the Sea, with all its Creeks, and Bays, and Inlets, and other Appendants, was made, and is very near equal to the whole dry Land,
with

with its Promontories and Mountains; if not in *Superficies*, yet in Bulk or Dimensions, though some think in both. Which Equality is still constantly maintained, notwithstanding all Inundations of Land, and Attenuations of Sea; because one of these doth always nearly balance the other, according to the vulgar Proverb we have before-mention'd, *What the Sea loses in one Place, it gains in another*. If any shall demand, How the Sea comes to be gradually depressed, and deepest about the Middle Part; whereas the Bottom of it was in all likelihood equal while the Waters covered the whole Earth? I answer, the same Cause that rais'd up the Earth, whether a subterraneous Fire or *Flatus*, rais'd up also the Skirts of the Sea, the Ascent gradually decreasing to the Middle Part, where, by reason of the Solidity of the Earth, or Gravity of the incumbent Water, the Bottom was not elevated at all. For the enclosed Fire in those Parts where its first Accension or greatest Strength was, rais'd up the Earth first, and cast off the Waters, and thence spreading by degrees, still elevated the Land, and drove the Waters farther and farther; till at length the Weight of them was too great to be rais'd, and then the Fire brake forth at the Tops of the Mountains, where it found least Resistance, and dispers'd itself in the open Air. The Waters also, where they found the Bottom sandy, or yielding,

ing, made their way into all those Cavities the Fire had made and left, filling them up as high as the Level of the Ocean. Neither let any Man imagine, that the Earth under the Water was too soft and muddy to be in this manner raised by subterraneous Fire; for I have shewn before, that the Bottom of the Sea is so saddened and hardened by the Weight of the incumbent Water, that the High-ways, beaten continually by Horses and Carriages, are not more firm and solid. But omitting this (which is only a Conjecture) I shall discourse a little more concerning the Equality of Sea and Land.

It hath been observed by some, that where there are high Cliffs or Downs along the Shore, there the Sea adjoining is deep; and where there are low and level Grounds, it is shallow; the Depth of the Sea answering to the Elevation of the Earth above it: And as the Earth from the Shores is gradually higher and higher, to the Middle and Parts most remote from the Sea, as is evident by the Descents of the Rivers, they requiring a constant Declivity to carry them down; so the Sea likewise is proportionably deeper and deeper from the Shores to the Middle. So that the Rising of the Earth from the Shores to the Mid-Land, is answerable to the Descent or Declivity of the Bottom of the Sea from the same Shores to the Mid-Sea. This Rising of the Earth from the Shores gradually to the Mid-

Mid-land, is so considerable, that it is very likely the Altitude of the Earth in those Mid-land Parts above the *Superficies* of the Sea, is greater than that of the Mountains above the Level of the adjacent Lands. To the Height of the Hills, above the common *Superficies* of the Earth, do answer, in *Brerewood's* Opinion, the extraordinary Depths or Whirl-pools that are found in the Sea, descending beneath the ordinary Bottom of the Sea, as the Hills ascend above the ordinary Face of the Land. But this is but a Conjecture of his; and to me it seems not very probable, because it is not likely there should be, in the Sea, extraordinary Depths of that vast Length and Extension, as those huge Ridges of Mountains that run almost quite through the Continents: And because I have observed the Waters of Rivers that flow gently, but especially of the Sea, to level the Bottoms of their Channels and Receptacles, as may be seen in those Parts of the Sea whose Bottoms are uncovered at Low-water; and in dry Lands that have been deserted by the Sea, as the Fens in the Isle of *Ely*, and the *Craux* in *Provence* in *France*, &c. which appear to be a perfect Level, as far as one can ken. Though possibly the Motion of the Sea may not descend down so low as those Depths, and so may not level the Bottoms of them.

But

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BUT against what I have said concerning the Leveling of the Bottom of the Sea, it may be objected, That Mariners and Divers find no such thing, but the quite contrary, viz. That the Bottom of the Sea is as unequal as the Land, sometimes ten or twelve Fathoms on one Side of the Ship, and one hundred on the other, as Mr. *Boyle* tells us in his *Relations about the Bottom of the Sea*, consonant whereto are the Accounts of Divers. And I have (saith my worthy Friend Dr. *Tanc. Robinson*, in one of his Letters to me) read in *Voyages*, of vast Rocks of Salt observ'd in some Places under the Sea.

To which I answer, That I should indeed have excepted such Places as are rocky, which bear a very little Proportion to the Latitude and Extent of the Sea, and are for the most part not far off the Land. I myself have seen so much of the Bottom of the Sea, round about the Coasts of *England*, and a good Part of the Low-Countreys, of *Italy* and *Sicily*, that, I think, I may boldly pronounce in general, That where the Bottom of the Sea is not rocky, but Earth, Owze, or Sand, (and that is incomparably the greatest Part of it) it is by the Motion of the Waters, so far as the Reciprocration of the Sea extends to the Bottom, brought to a Level; and if it should be now unequal, would in time be level'd again. By Level, I do not mean so as to have no Declivity, (for the Reciprocration preserves that,

that, the Flood hindring, in good measure, the constant Carrying down of the Bottom) but only to have an equal, uniform, and easie Descent from the Shores to the Deeps. Now, all those Reports of Divers and Navigators referr, for the most part, to rocky Places. For Mariners seldom found but in such Places, and in Shallows; and Urinators have no reason to dive where the Bottom is level and sandy. And that the Motion of the Waters descends to a good Depth, I prove from those Plants that grow deepest in the Sea, because they all generally grow flat in manner of a Fan, and not with Branches on all sides, like Trees; which is so contrived by the Providence of Nature, because the Edges of them do, in that Posture, with most ease, cut the Water flowing to and fro: And should the flat Side be objected to the Stream, it would be turned Edgewise by the Force of it; because, in that Site it doth least resist the Motion of the Water: Whereas, did the Branches of those Plants grow round, as in Trees, they would be thrown down backward and forward every Tide. Nay, not only the herbaceous and woody submarine Plants, but even the *Lithophyta* themselves affect this manner of Growing, if they be any thing Ramose, and rise to a considerable Height, as I have observed in various Kinds of *Corals* and *Pori*. Hence I suspect those Relations of Trees growing at the Bottom of the Sea, and

and bringing forth Fruit there. As for the *Maldiva Nut*, till better Information, I adhere to *Garcias* his Opinion, That the Trees that bare those Nuts were, of old time, together with the Land on which they grew, overwhelmed by the Inundations of the Sea, and there hardned in the Earth, and afterwards cast up by the Working of the Sea again. Which thing is very probable; for to this day, some of those *Maldiva* Islands are now and then drowned, and swallowed up by the Sea. Farther, I do believe, that in the great Depths of the Sea there grow no Plants at all, the Bottom being too remote from the external Air; which, though it may pierce the Water so low, yet I doubt, whether in Quantity sufficient for the Vegetation of Plants. Nay, we are told, that in those deep and bottomless Seas, there are no Fish neither: Yet, not because there are no Plants or Insects to feed them; for that they can live upon Water alone, *Rondeletius* his Experiment about keeping them in a Glass, doth undeniably prove; but because their Spawn would be lost in those Seas, the Bottom being too cold for it to quicken there. This Answer and Discourse, though it be inserted into another Treatise, yet properly belongs to this place, to which I have, therefore, restored it; begging the Reader's Excuse for this Repetition. I now proceed.

THAT

THAT it is consonant to the best Observations of the Height of the Earth and its Mountains above the *Superficies* of the Sea ; and of the Depth of the Sea ; that the one is answerable to the other. *Varenius*, in his *Geogr.* witnesseth, p. 152. *Ceterum ex observata hæcenus in plerisque locis profunditate Oceani, manifestum est, eam fere æqualem Altitudini sive Elevationi montium & locorum Mediterraneorum supra littora, nimirum quantum hæc elevantur & extant supra littorum horizontem, tantum abvei maris infra eum deprimentur ; sive quantum assurgit terra à littoribus versus mediterranea loca, tantundem paulatim magis magisque deprimitur usque ad medii Oceani loca, ubi plerumque maxima est profunditas.* That is, From the Depth of the Ocean, as far as hath been hitherto observed in most Places, it is manifest, that that [Profundity] is near equal to the Altitude or Elevation of the Mediterranean Places above the Shores ; that is to say, as much as these are elevated, and stand up above the Horizon of the Shores, so much are the Channels of the Seas depressed below it : Or, as much as the Earth riseth from the Shores towards the Mediterranean Places ; so much it is by little and little, more and more, depressed to the middle Parts of the Ocean, where the greatest Depth for the most part is.

AND *Brerewood*, in his Enquiries, pertinently to our Purpose, supposeth the Depth of

of the Sea to be a great deal more than the Height of the Hills above the common Surface of the Earth. ---*For that in making Estimation of the Depth of the Sea, we are not to reckon and consider only the Height of the Hills above the common Superficies of the Earth, but the Advantage or Height of all the dry Land above the Superficies of the Sea: Because the whole Mass of the Earth, that now appeareth above the Waters, being taken, as it were, out of the Place which the Waters now possess, must be equal to the Place out of which it was taken; and consequently it seemeth, that the Height or Elevation of the one should answer to the Depth or Descending of the other. And, therefore, as I said, in estimating the Deepness of the Sea, we are not to consider only the Erection of the Hills above the ordinary Land, but the Advantage of all the dry Land above the Sea. Which latter, I mean the Height of the ordinary Main Land, is in my Opinion more in large Continents above the Sea, than that of the Hills is above the Land. For, that the plain and common Face of the dry Land, is not level or equally distant from the Center, but hath great Declivity and Descent towards the Sea, and Acclivity or Rising toward the Mid-Land Part, although it appear not so to the common View of the Eye, is to Reason notwithstanding manifest. Because, as it is found in that Part of the Earth which the Sea covereth, that it descendeth*

descendeth lower and lower toward the midst of the Sea ; (for the Sea which touching the upper Face of it is known to be level by Nature, and evenly distant from the Center, is withall observed to wax deeper and deeper the farther one faileth from the Shore towards the Main) even so, in that Part which is uncovered, the Coursings and Streamings of Rivers on all Sides, from the Mid-Land Parts towards the Sea, (whose Property we know is to slide from the higher to the lower) evidently declare so much. * This Author, with *Damascen*, supposes, that the Unevenness and Irregularity, which is now seen in the *Superficies* of the Earth, was caused either by taking some Parts out of the upper Face of the Earth in sundry Places to make it more Hollow, and laying them in other Places to make it more Convex: Or else (which in effect is equivalent to that) by raising up some, and depressing others, to make Room and Receipt for the Sea ; that Mutation being wrought by the Power of that Word, *Let the Waters be gathered into one Place, that the dry Land may appear*. This Proportioning of the Cavities appointed to receive the Seas, to the Protuberancy of the dry Land above the common *Superficies* of the Ocean, is to me a sufficient Argument, to prove, that the Gathering together of the Waters into one Place, was a Work of Counsel and Design ; and if not effected by the immediate

* *De fide
Orisod. l.
2. c. 10.*

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mediate

mediate Finger of G O D, yet at least govern'd and directed by Him. So the Scripture affirms the Place to receive the Sea, to have been prepared by G O D, *Pfal.* civ. 8. Now in things of this Nature, to the giving an Account whereof whatever *Hypothesis* we can possibly invent, can be but meerly conjectural; those are to be most approved that come nearest to the Letter of Scripture, and those that clash with it to be rejected, how trim or consistent soever with themselves they may seem to be: This being as much, as when G O D. tells us how He did make the World, for us to tell Him how He should have made it.

BUT here it may be objected, That the present Earth looks like a Heap of Rubbish and Ruins; And that there are no greater Examples of Confusion in Nature, than Mountains singly or jointly considered; and that there appear not the least Footsteps of any Art or Counsel, either in the Figure and Shape, or Order and Disposition of Mountains and Rocks. Wherefore it is not likely they came so out of G O D's Hands; who by the Ancient Philosophers is said αἰεὶ γεωμετρῆν, and to make all things in Number, Weight, and Measure.

TO which I answer, That the present Face of the Earth, with all its Mountains and Hills, its Promontories and Rocks, as rude and deformed as they appear, seems to me a very

ry beautiful and pleasant Object, and with all that Variety of Hills, and Valleys, and Inequalities, far more grateful to behold, than a perfectly level Country, without any Rising or Protuberancy, to terminate the Sight: As any one, that hath on the one hand seen the Isle of *Ely*, or any the like Country exactly level, and extending on all Sides farther than one can ken, or that hath been far out at Sea, where nothing is to be seen but Sky and Water: And on the other, from the Downs of *Sussex* enjoyed that spacious and ravishing Prospect of the Country on one hand, and the Sea on the other, comparing both Objects, must necessarily confess.

2. THEY are useful to Mankind in affording them convenient Places for Habitation, and Situations of Houses and Villages; serving as Skreens to keep off the cold and nipping Blasts of the Northern and Easterly Winds, and reflecting the benign and cherishing Sun-Beams, and so rendring their Habitations both more comfortable and chearful in Winter; and promoting the Growth of Herbs and Fruit-Trees, and the Maturation of their Fruits in Summer. Besides, casting off the Waters, they lay the Gardens, Yards and Avenues to the Houses dry and clean, and so as well more salutary as more elegant. Whereas Houses built in Plains, unless shaded with Trees, stand bleak and exposed to Wind and

Weather ; and all Winter are apt to be grievously annoyed with Mire and Dirt.

3. A LAND so distinguished into Mountains, Valleys and Plains, is also most convenient for the Entertainment of the various Sorts of Animals, which GOD hath created, some whereof delight in cold, some in hot, some moist and watery, some in dry and upland Places, and some of them could neither find nor gather their proper Food in different Regions. Some Beasts and Birds we find live upon the highest Tops of the *Alps*, and that all the Winter too, while they are constantly covered with Snow, as the *Ibex* and *Rupicapra*, or *Chamois* among Quadrupeds, and *Lagopus* among Birds.

4. THE Mountains are most proper for the putting forth of Plants ; yielding the greatest Variety, and the most luxuriant Sorts of Vegetables, for the Maintenance of the Animals proper to those Places, and for medicinal Uses, partly also for the Exercise and Delight of such ingenious Persons as are addicted to search out and collect those Rarities, to contemplate and consider their Forms and Natures, and to admire and celebrate the Wisdom of their Creator.

5. ALL manner of Metals, Minerals and Fossils, if they could be generated in a level Earth, of which there is some Question, yet should they be dug or mined for, the Delfs must necessarily be so flown with Water, (which

(which to derive and rid away, no *Adits* or *Soughs* could be made, and I much doubt whether Gins would suffice) that it would be extremely difficult and chargeable, if possible to work them at all.

6. NEITHER are the very Tops of the highest Mountains barren of Grass for the feeding and fattening of Beasts. For on the Ridges of the high Mountains of *Jura* and *Saleve* near *Geneva*, and those of *Rhetia*, or the *Grisons* Country, which are the highest of all the *Alps*, excepting the *Vallesian* and *Sabaudian*, there are Multitudes of Kine fed in Summer-time, as I myself can witness, having in my Simpling Voyages on those of *Jura* and *Saleve* observed Herds of Cattle there, and many Dairy-Houses built, where I have been more than once refreshed by their Milk, and Milk-Meats. Nay, there are but very few, and those of the highest Summits of the *Alps*, that keep Snow all Summer : And I was told by the Inhabitants, that one time or other, in seven or eight Years Space, for the most part there came a Summer that melted all the Snow that lay on them too.

7. ANOTHER great Use and Necessity of the Mountains and Hills, is for the Generation and Maintenance of Rivers and Fountains, which (in our *Hypothesis*, that all proceed from Rain-water) could not be without them, or but rarely. So we should have only

* *Observat. Physic.*
cal, &c.

Torrents, which would fail in Summer-time, or any dry Season, and nothing to trust to, but stagnating Water reserved in Pools and Cisterns. Which how great an Inconvenience it would be, I need not take Pains to shew. I say, that Fountains and Rivers would be but rare, were there no Mountains: For, upon serious Consideration, I find that I was too hasty in * concluding, because I had observed no Fountains springing up in Plains, therefore there were, or could be, absolutely none; and do now grant, that there is Reason to believe the Relations made of such. For the whole dry Land being but one continued Mountain, and ascending all along from the Sea to the Mid-Land, as is undeniably proved by the Descent of Rivers even in plain Countries; the Water sinking into the Earth, may run under Ground, and according as the Vein leads it, break out in the Side of this Mountain, tho' the Place, as to outward Appearance, be a Plain.

I SHALL now add, That tho' it be possible that without Mountains there may be Springs, if there should be Rains, (which it is something questionable were there no Mountains, whether there could be or no, at least in hot Countries) yet it is probable, that most of those Springs we find in Plains, or depressed Places distant from Mountains, may come along in subterraneous Channels from

from the next Mountains, and there break out. Monsieur *Blumel* related to the *Parisian* Academy, what Device the Inhabitants of the Lower *Austria*, which is encompassed with the Mountains of *Stiria*, are wont to use to fill their Wells with Water: They dig in the Earth to the Depth of twenty or five and twenty Foot, till they come to an *Argilla* [clammy Earth] then they bore a Hole in the midst of a Stone about five or six Inches broad, and through it bore the *Argilla* so deep, till the Water breaks forcibly out; which Water, it's probable, comes from the neighbouring Mountains in subterraneous Channels. And *Cassinus* observed, That in many Places of the Territory of *Modena* and *Bologna* in *Italy*, they make themselves Wells of springing Water by the like Artifice. They dig in the Earth till they come to the Water (which stagnates in common Wells) which they draw quite out. Then within this new digged Well they make two cylindrical Walls, concentrical one to another; the Space or Interstice between them they fill and ram close with well-wrought *Argilla*, or Clay, to keep out the ambient Water; which done, they sink the Well deeper into the Ground, and continue the inner Wall so low, till the Earth underneath seems to swell by the Force of the Water rising up: And lastly, they bore this Earth or Soil with a long Wimble; whereupon the Water breaks forth

Of the Chaos

forth through the Hole with a great Force; so that it doth not only fill the Well, but overflows and waters the neighbouring Fields with a constant Stream: By this means the same Signor *Cassini* made a Fountain at the Castle of *Urbino*, that cast up the Water five Foot high above the Level of the Ground. It is very probable that these Waters descend by subterraneous Passages from the *Appennine* Mountains, which are about ten Miles distant. If such things may be done by Art, why may they not also by Nature? Nay, that the like are done, we find by Experience, in the *Lacus Lugeus*, or *Zirchnitzer-Sea* in *Carniola*, which after it is empty of Water running out at Holes or Pits in the Bottom, (which it doth yearly in the Summer-time, in the Months of *May*, *June*, and *July*) in the Autumn, when it rains moderately, the Water spouts out of some of the forementioned Pits two or three Fathoms perpendicularly; but when it rains very hard and long together, especially with Thunder, then the Water breaks forth with great Force, not only from the foresaid Pits, but likewise at a thousand other Caves and Holes, spirting several Fathoms high, from some perpendicularly, from others obliquely, so that there is not a pleasanter Sight than this, and in a short time fills the Lake. A full Description, and an Account of all the *Phænomena* of this admirable Lake, see in *Philosoph. Transact.*
Numb.

Numb. 191. p. 411, &c. So we see, Water may be brought down from the Mountains, and raised up naturally in strait Channels; with that Force, and to that Height, as to exceed all the artificial Jets in the World, if not in the Altitude of the Spout, yet in the Bigness of the Stream abundantly.

As for the Wells about *Modena*, because wheresoever you dig about that City for some Miles, at the Depth of 63 Foot you meet with Water under such a Bed of *Argilla*, which spouts up, and rises as high, and higher than the adjacent Country; I guess there is a subterraneous Lake, whose Waters are compressed between, perhaps, the Sea or fresh Water on one hand, which forces them upward, and the Bed of *Argilla* on the other, which keeps them down; which Bed, when it is bored through, they rush upwards, *quâ data porta*, with great Force, and fill the new digged Well. This I propose as Conjecture not altogether improbable.

THIS End and Use of Mountains, I find assigned by Mr. *Halley*, in his Discourse concerning the Original of Springs and Rivers, in these Words: *This, if we may allow final Causes*, (and why may we not? what needs this Hesitancy and Dubitation in a thing that is clear?) *seems to be the Design of the Hills, that their Ridges being placed through the midst of the Continents, might serve, as it were Alembicks,*

lemicks, to distill fresh Water for the Use of Man and Beast, and their Heights to give a Descent to those Streams to run gently, like so many Veins of the Macrocosm, to be the more beneficial to the Creation.

BUT some may say, Granting there be some Use and Benefit of moderate Hills and Rises; what necessity is there of such extended Ridges of vast and tow'ring Mountains, hiding their Heads among the Clouds, and seeming for Altitude to contend with the Skies? I answer, There is very great Use of them, for repelling the Vapours exhaled by the Sun-beams in the hot Regions, and hindring their Evagations Northward, as we have already shewn, and shall not repeat. I might add hereto,

8. THOSE long Series and Chains of Mountains are of great Use for Boundaries and Limits to the Territories of Princes or Commonwealths, to secure them on those Parts from sudden Incurfions of Enemies. As for the Rudeness and Confusion of Mountains, their cragged and broken Rocks and Cliffs, and whatever other Disorder therẽ may be among them, it may be accounted for, from the Manner of their first Generation, and those other Mutations they have been since obnoxious to, by Earthquakes, Eruptions of *Vulcano's*, foundering and falling in of their Props and Foundations, and by Time and Weather too, by which not only the Earth

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is washed away, or blown off from the Stones, but the very Stones and Rocks themselves corroded and dissolved, as might easily be proved by Instances, could I spare time to do it.

To sum up all, relating to the Division and Disposition of the Water and Earth, in brief.

1. I SAY, the Water being the lighter Element, doth naturally occupy the upper Place, and stand above the Earth; and so at first it did. But now, we see, it doth not so; the Earth being, contrary to its Nature, forcibly elevated above it; being (as the *Psalmist* phraseth it) founded above the Seas, and established above the Floods; and this, because it was best it should be so, as I shall clearly prove and deduce in Particulars in another Discourse.

2. THE dry Land is not elevated only upon one Side of the Globe; for then, had it had high Mountains in the middle of it, with such vast empty Cavities within, as must be equal to the whole Bulk raised up, the Center of Magnitude must needs have been considerably distant from the Center of Gravity; which would have caused a very great and inconvenient Inequality in the Motion of the Parts of the Earth: But the Continents and Islands are so equally dispers'd all the Globe over, as to counterbalance one another;

another; so that the Centers of Magnitude and Gravity concur in one.

3. THE Continents are not of exactly equal and level *Superficies* or Convexity. For then, the Parts subject to the Course of the Sun, called the *Torrid Zone*, would have been, as the Ancients fancied them, uninhabitable for Heat and Drought. But there are huge Ridges and extended Chains of lofty Mountains directed, for the most part, to run East and West; by which means, they give free Admittance and Passage to the Vapours, brought in by the Winds from the *Atlantick* and *Pacifick* Oceans; but stop and inhibit their Excursions to the North and South, either condensing them upon their Sides into Water, by a kind of external Distillation; or by straightning and constipating of them, compelling them to gather into Drops, and descend down in Rain.

THESE are great things, and worthy the Care, Direction, and Disposal of the Great and Wise Creator, and Governor of all things: And, we see, they are accordingly excellently ordered and provided by Him.





CHAP. IV.

Of the Creation of Animals; some Questions resolved.



S to the first Creation of Animals, I have already proposed two Opinions, both consonant or reconcileable to the Scriptures.

1. THAT GOD Almighty did at first create the Seeds of all Animals, (that is, the Animals themselves in little) and dispers'd them over the superficial Part of the Land and Water, giving Power to those Elements to hatch and bring them forth; which when they had done, and all the Animals of these created Seeds were produced and perfected, there remained no more Ability in them to bring forth any more; but all the succeeding owe their Original to Generation.

2. BECAUSE some will not admit that GOD at first created any thing imperfect, we did propose that He might, by His Almighty Power, out of the Water and Earth, make the first Sett of Animals in their full State and Perfection, (as it is generally believed He did *Adam*) and give to each *Species* a Power by Generation to propagate their Like. For, His commanding the Waters and Earth to produce

duce such and such living Creatures, signifies that He did Himself efficaciously form them out of the Earth and Water ; as when He saith, *Let there be Light, &c.* the Meaning is not, that He did permit or command something else besides Himself, to produce Light ; but that He did, by His own Almighty Power, effectually create it. Indeed, the Scripture doth in this manner interpret itself : For, whereas it is said, *verses 20, and 24. Let the Waters bring forth, &c.* and, *Let the Earth bring forth the living Creature, &c.* In the next Verses it follows, *And GOD created great Whales, and every living Creature that moveth, &c. And GOD made the Beast of the Earth, &c.* But now there may a farther Question or two be moved, concerning the Creation of Animals.

I. WHETHER GOD created, at first, a great Number of every Kind of Animal all the Earth over, in their proper Places and Climates ; or only of two of each *Species*, a Male and a Female, from which all the rest proceeded by Generation ? This latter Opinion I find embraced by some modern Philosophers, and it may be made probable by several Arguments.

First, From the Analogy to Mankind. There being, at first, only one Man and one Woman created ; it is very likely, there were no more of any other Creatures, two being

being sufficient, in a short time, to stock the World.

Secondly, Because, at the time of the General Deluge, there were only two of each Kind (of unclean Beasts) preserved in the Ark: And if two might thence suffice, why not as well at the first Creation? And if there were no need of creating more, what likelihood that there were more created?

BUT the first Opinion, That there were many at first created, seems more consonant to Scripture; which, in the Mention of the Creation of Aquatic Creatures, useth the Word *Abundantly*, Gen. i. 20. *And God said, Let the Waters bring forth abundantly the moving Creature that hath Life, and Fowl that may fly above the Earth, in the open Firmament of Heaven.* And, in the next Verse it is said, *That the Waters did bring them forth abundantly.* So that, at least, of Birds and Fishes, there were many Individuals at first created. As for Plants, certain it is, that they were created dispersedly all the World over; they having no locomotive Power, but being fix'd to a place, and the Seeds of many of them being ponderous, and not portable by Winds, or any other Means, and yet those of the same Species to be found in far distant Places, and on the Tops of high Mountains, as remote from each other, as the *Helvetick* and *Austrian Alps*.

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2. CONCERNING the Creation of Animals, there may yet a farther Question be moved, *viz.* Whether all Animals that already have been, or hereafter shall be, were at first actually created by GOD? or, Whether hath He given to each Kind of Animal such a Power of Generation, as to prepare Matter, and produce new Individuals in their own Bodies? Some are of Opinion, that GOD did Himself, at first, actually create all the individual Animals that ever were, or ever shall be; and that there is no such thing, as any Productions of new ones. For, say they, What were that, but a Creation of such Individuals? And, what did GOD at the first Creation, more than, if this be true, we see every day done, that is, produce a new Animal out of Matter, which itself prepares? All the Difference is, the doing that in an Instant which the Creature must take Time to do. For, as for the Preparation of Matter, that must be made fit, be the Agent never so Omnipotent.

BESIDES, the Animal-Parent cannot be the Agent or Efficient in the Generation, or Forming and Nourishing of the *Fetus*. Because that is a Work of Art and Reason, which brute Creatures are not endued withall; nor, indeed, doth Man himself understand any thing of the Process of Generation in himself, neither is conscious of what
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is done in the Womb; so far is he from being the Doer of it.

AGAIN, it is most probable, if not certain, that most Animals have in them, from the Beginning, the Seeds or Eggs of all the Young they shall afterward bring forth, which when they are spent and exhaust, the Creature becomes barren, or effete. So we see all the Female *Fetus* of viviparous Quadrupeds are brought forth with their *Testes*, or *Ovaria* in them, which are esteemed Parts of their Bodies; and all Birds have in them, from their first Formation, their Ovary or Egg-cluster, containing the Seeds of all the Eggs they shall ever lay. Now, had the Creature a Power of producing new ones, what need was there that there should be so many at first formed in them? And, why might they not breed them as well afterwards, as at the beginning?

HEREUPON these Philosophers argue thus: Suppose we, that GOD did at first create two Animals, a Male and a Female: The Female must be created with its *Ovaries* or *Testes*, which (as we said) contained so many Seeds or Eggs as the Creature should ever bring forth Young. So it is clear, that not only the first Pair, but the first Generation of Animals, were actually created. Again, this first Generation, from their first Appearance, had each of them (the Females I mean) its *Ovaria*, or Clusters of Eggs, every one where-
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of had, in like manner, its Animalcule in it; so that this second Generation was also created in the first. The same may be demonstrated of the third and fourth; and so on, of all the Generations that shall be as long as the World lasts.

AGAINST this Doctrine it may be objected, *First*, That it seems impossible that the *Ovaries* of one Female should actually include and contain the innumerable Myriads of Animals that may proceed from it in so many Generations, as have been and shall be during the Continuance of the World. Who can conceive such a small Portion of Matter to be capable of such Division, and to contain such an Infinity of Parts?

BUT to this it may be answered, That our Sight doth not give us the just Magnitude of Things, but only their Proportion; and what appears to the Eye as a Point, may be magnified so, even by Glasses, as to discover an incredible Multitude of Parts; nay, some Animals there are, so small, that if a Grain of Sand were broken into 8000000 of equal Parts, one of these would not exceed the bigness of one of those Creatures, as Mr. *Lewenhoek* affirms. And Dr. *Hook* proceeds farther, and says, that he had discovered some so exceeding small, that Millions of Millions might be contained in one Drop of Water. If these whole Creatures be so incredibly little, what shall we think of

of their Parts containing and contained, their Entrails and Muscles, their Ovaries and Eggs? But for a sensible Demonstration of the Unconceivable, I had almost said Infinite, Divisibility of Matter, I might referr the Reader to the Honourable Mr. *Boyle*, of famous Memory, his Discourse concerning the strange Subtilty of *Effluvioms*. I shall mention one or two Experiments. ' He dissolved one ' Grain of filed Copper in Spirit of *Salt-Ar-* ' *moniack*, and, upon this Solution, he poured ' so much distilled Water by degrees, as till ' the fair and deep blue Colour grew some- ' what pale, without being too dilute to be ' manifest: And then carefully weighing the ' Vessel and the Water, and subducting the ' Weight of that out of this, he found the ' Weight of the Liquor alone, when reduced ' to Grains, to amount to 28534; so that a ' Grain of Copper communicated a Tincture ' to 28534 times its Weight. Now, consider- ' ing that the Weight of Copper to the ' Weight of Water of the same Bulk, is *pro-* ' *xime* as 9 to 1, a Grain-weight of Copper ' is in bigness but the ninth part of as much ' Water as weighs a Grain; and so the for- ' merly mentioned Number of Grains of Wa- ' ter must be multiplied by 9, to give us the ' Proportion between the tinging Body and ' tinged Liquor; whence it will follow, that ' a single Grain of Copper gave a Blueness ' to above 256806 Parts of limpid Water,

each of them as big as it. And to prosecute this Experiment farther, he mixt together equal Parts of distilled colourless Water, and of the said tinted Liquor, and found, that though the Colour was very faint and dilute, yet an attentive Eye could easily discern it to be bluish; whereby it appears, that one Grain of Copper was able to impart a Colour to double the Quantity of Water above-mentioned, that is, to 513612 Grains of Water.

OTHER Experiments there are, in the same Discourse, made in odorate Bodies: Having, *saieth he*, for Curiosity-sake, suspended in a Pair of exact Scales, that would turn with a very small Part of of a Grain, a Piece of *Ambergreece* bigger than a Walnut, and weighing betwixt a hundred and sixscore Grains, I could not in three days and a half, that I had Opportunity to make the Trial, discover, even upon that Balance, any Decrement of Weight in the *Ambergreece*, though so rich a Perfume lying in the open Air was like, in that time, to have parted with good store of odoriferous Steams: And, a while after, suspending a Lump of *Asafetida* five days and a half, I found it not to have sustained any discernible Loss of Weight, though, in spite of the unfavourable cold Weather, it had about it a neighbouring Atmosphere, replenished with foetid Exhalations, &c.

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BUT what can be imagined more small and subtil, than the minute Parts of the Steams of Animals? The same Author, in the same Tract, tells us, ' That a good Setting Dog, by his way of Ranging the Fields, and his other Motions, especially of his Head, would not only intimate the Kinds of Game, whose Scent he chanced to light upon, but would discover where Partridges had been (though, perhaps, without staying in that Place) several hours before." He farther tells us, ' That a very sober Gentleman of his Acquaintance, who had often occasion to employ Blood-hounds, assured him, that if a Man had but passed over the Field, the Scent would lie, so as to be perceptible enough to a good Dog of that sort, for several hours after." And an ingenious Hunter likewise assured him, ' That he had observed, that the Scent of a flying and hunted Deer, will sometimes continue upon the Ground from one Day to the next following." He proceeds farther; ' And now we may consider these three things; First, That the Substance left upon the Ground by the transient Tread of a Partridge, Hare, or other Animal, that doth but pass along his Way, does probably communicate to the Grass or Ground but some of those Effluxions that transpire out of his Feet, which being small enough to escape the Eye, may probably not amount to one

' Grain in Weight, or perhaps not to the
 ' Tenth Part of it. *Next*, That the Parts
 ' of fluid Bodies, as such, are perpetually in
 ' Motion, and so are the invisible Particles
 ' that swim in them, as may appear by the
 ' Dissolution of Salt or Sugar in Water, and
 ' the Wandring of aqueous Vapours through
 ' the Air, even when the Eye perceives them
 ' not. And, *Thirdly*, That though the At-
 ' mosphere of one of these small Parcels of
 ' the exhaling Matter we are speaking of,
 ' may oftentimes be exceeding vast in com-
 ' parison of the emittent Body, as may be
 ' guessed by the Distance, at which some Set-
 ' ters or Bloodhounds will find the Scent of
 ' a Partridge or Deer; yet, in Places exposed
 ' to the free Air or Wind, 'tis very likely
 ' that these Steams are assiduously carried a-
 ' way from their Fountain, to maintain the
 ' forementioned Atmosphere, for six, eight,
 ' or more hours; that is, as long as the Scent
 ' hath been observed to lie, there will be re-
 ' quisite a continual Recruit of Steams suc-
 ' ceeding one another. And that so very small
 ' a Portion of Matter, as that which, we were
 ' saying, the *Fomes* of these Steams may be
 ' judged to be, being sensibly to impregnate
 ' an Atmosphere incomparably greater than
 ' itself, and supply it with almost continual
 ' Recruits, we cannot but think, that the
 ' Steams it parts with, must be of extreme
 ' and scarce conceivable Minuteness." *So far*
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the Author. To which I shall add, That by the Steams, I suppose, he means the minute Particles of which the Steams are compounded. Now these minute Particles themselves must be compound Bodies, because they affect the Sense in a particular manner, so that a sagacious Creature can distinguish by them, not only Species but Individuals; as a good Dog, by the Foot, will find out his Master, though not only several other Creatures, but several Men have passed that way: Unless we will groundlessly affirm, that those Particles are the *minima Naturalia*, and that the Creature discerns them by their Figure, or their different manner of Motion.

A SECOND Objection of *Brunnerus* (as I find him quoted in *Peyerus* his *Merycologia*) is this: *Si cuncta Animalium membra jam formata existant in ovo, &c.* ‘ If all the
 ‘ Members of Animals, already formed, do
 ‘ exist in the Egg, though for their Smallness
 ‘ they escape our sight; I cannot conceive,
 ‘ how by the Force of Imagination alone, in
 ‘ a pregnant Woman, can be produced
 ‘ sometimes Calves-heads, or Feet, sometimes a Dog’s Face, or other monstrous
 ‘ Members; these Productions being a certain and experimental Proof, that the Parts
 ‘ and Members of Animals are formed and
 ‘ delineated originally in the Womb, or
 ‘ Egg.

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To this, *Peyerus* replies: ' Who then
 ' forms ? who delineates such Monsters ?
 ' Shall we accuse GOD the Creator ? But
 ' He is just, and doth not make enormous
 ' things : Or, Will you blame Nature ? that
 ' is, the constant Order and Will of GOD,
 ' which never is deficient ? Will you lay
 ' the fault upon the plastick Vertue or
 ' Power residing in the Womb or Seed, and
 ' acting those things ? But that is a *Chimæ-*
 ' *ra* ; it is nothing, it is an Idol. There re-
 ' main Two Things to which the Cause
 ' may justly be imputed ; the *Imagination of*
 ' *the Mother*, which may and doth often-
 ' times effect wonderful things in the Body
 ' of the tender *Embryon* ; and *the Devil*. If
 ' you refuse to admit the former, you are
 ' obliged to accept the latter. And, truly,
 ' the Devil may, GOD so permitting, many
 ' ways abuse Men, and transfigure the Young
 ' in the Womb, to punish the wicked and
 ' nefarious Actions of degenerate Mankind,
 ' indulging themselves in obscene Imagina-
 ' tions, or preposterous and unnatural Im-
 ' purities and Pollutions. But do these Er-
 ' rors and Enormities take away the Order
 ' of Nature ? By no means : For, from
 ' what is rare and extraordinary, and sel-
 ' dom happens, there is no Consequence to
 ' be drawn. For though Monsters are some-
 ' times born, nothing hinders but that we
 ' may still think, that the *Ideas* of the seve-
 ' ral

ral *Fetus* may be præexistent and latent in the Eggs; and the Event may teach us, that those *Ideas* or *Embryos* may, by a violent Cause, be marred and deformed in the Womb; as Wax, though it be already figured, while it is soft, is easily altered, and capable of receiving new Impressions.

BUT against this Answer we may thus plead in Defence of *Brunnerus*: As to what is said of the Devil, it seems to be but a Shift or Refuge to have recourse to, when we are at a Loss, and pinch'd with an Argument; as in the ancient Stage-plays, when they were put to a plunge, they were forced to bring in some *θεὸς ἀπὸ μηχανῆς* to help them out. And as for the Imagination of the Mother, strange it is, that that should have any Influence at all upon the Formation of the *Fetus*; the Mother not knowing any thing that's done in the Womb; nor being conscious to herself of any Power to form or act any thing there: The *Fetus* being an external thing to her, and no more a Part of her, than an Egg is of the Hen that sits upon it, affording nothing to it but Warmth and Nourishment. And we see, Eggs may be hatched by the artificial Heat of an Oven, without the Incubation of a Hen. But granting, that the Imagination of the Mother may transform the *Fetus*, why may it not as well originally form it out of prepared

pared Matter? and then, what need of an Idea or minute Animalcule in the Seed? But whatever may be said of Men, how come Monsters in Brutes, which, according to *Peyerus*, are meer Machines, and have no Imagination or Perception at all?

BUT not to lead the Reader into a Mæze or Labyrinth, and leave him there; for my own part, I must confess, that the Argument for the Præexistence of the *Fætus*'s, or their Creation from the Beginning, taken from the due Number of Eggs that are in every Female from her first Formation, and her being effete after they are spent, weighs very much with me, as I know not how to quit myself of it. And on the other hand, if those Stories concerning Dogs and Serpents, &c. found in the Wombs of Women be true (which are well attested) I acknowledge it very difficult to give an Account, how those Animals came to be bred or formed there. But I had rather confess my Ignorance of the Manner of the Production of such præternatural and extraordinary things, than to permit it to have such Influence upon me, as to remove me from so well-grounded an Opinion concerning the ordinary Production of Animals in a natural Way.

BUT notwithstanding all I have said, in Defence of the Creation of the Individuals of all Animals at first, because the inconceivable

vible Smalness of the last Races of Animals make it incredible, I shall be content to let it pass for a Conjecture, and not insist farther upon it.

THE Being of a Plastick Nature, subordinate to God, notwithstanding *Peyrus* makes an Idol of it, and charges those with Idolatry who do believe it, I am not afraid to admit: My Reasons for which, I have given in another * Discourse, and shall not here repeat.

* Wisdom
of God in
the Crea-
tion.

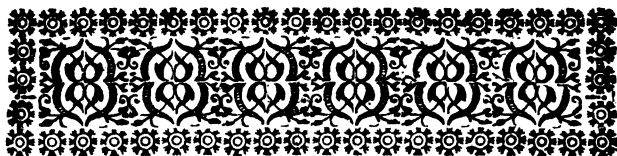
THE new Opinion of Mr. *Lewenhoek*, that all Animals proceed from an Insect or Animalcule in the Male-sperm, I think I have sufficiently confuted in my Book, Entituled, *Synopsis methodica Animalium Quadrupedum*, pag. 37. & seqq. to which I refer the Reader: Only I shall repeat, that I am less inclinable to it, because of the necessary Loss of an incredible Multitude of them, which seems not agreeable to the Wisdom and Providence of Nature. For, supposing every Male hath in him all the Animalcules that he shall or may eject; they may, for ought I know, amount to Millions of Millions, and so the greatest part of them must needs be lost. Nay, if we take but one *Cott*, there must, in uniparous Creatures at least, abundance be lost. But if we suppose the *Fetus* to be originally in the Egg, it is not so. For the Eggs of all sorts of Creatures are so proportioned to the Nature of the Animals, the
Time

Time that they live, the Time and Number of their Gestations, and the Number they bring forth at all times, that they will much about suffice for the Time the Creatures are fit to breed and nourish their Young: So that they may, if need be, be all brought forth, and come to Perfection.

The End of the First Discourse.



DIS-



DISCOURSE II.



Of the general Deluge in the Days of NOAH, its Causes and Effects.



PROCEED now to say something concerning the General Deluge in the Days of *Noah*; which was also a Matter of ancient Tradition. I shall not enlarge much upon it, so as to take in all that might be said, but confine myself to Three Heads. 1. I shall confirm the Truth of the History of the Deluge recorded in the Scripture, by the Testimonies of some ancient Heathen Writers. 2. I shall consider the Natural Causes or Means whereby it was effected. 3. I shall enquire concerning the Consequences of it, what considerable Effects it had upon the Earth.

C H A P.



CHAP. I.

Testimonies of Ancient Heathen Writers concerning the Deluge.



FIRST then, I shall produce some Testimonies of Ancient Heathen Writers concerning the Deluge.

THE first shall be those of *Berosus*, recorded by *Josephus*. The first, in his first Book against *Appion*, where he tells us, ‘ That *Berosus*, following the most ancient Writings, relates the same things with *Moses* concerning the great Deluge, and the Destruction of Men by it; and of the Ark, in which *Nochus*, the Author of our Stock, was preserved, after it rested on the Tops of the *Armenian Mountains*. ” And the second, in the fifth Chapter of his first Book of *Jewish Antiquities*; Βηρωσσός δὲ Χαλδαῖος διηγούμενος τὰ περὶ τὸν κατακλυσμὸν, ἔτω πᾶς διεξιέεισι, &c. That is, ‘ *Berosus the Chaldean*, relating the Story of the Deluge, writes thus: ‘ It is reported, that there is some part of the Vessel [the Ark] still remaining at the Mountain of the *Gordyæans*; and that certain Persons scraping off the *Bitumen*, or Pitch, carry it away; and that Men make use

‘ use of it for Amulets, to drive away Diseases.

A SECOND Testimony the same *Josephus* affords us in the same Place, and that is, of *Nicolaus Damascenus*; ‘ who, saith he, gives ‘ us the History [of the Ark and Deluge] in ‘ these Words: About *Minyas* in *Armenia*, ‘ there is a great Mountain called *Baris*, to ‘ which it is reported, that many flying, in ‘ the time of the Deluge, were saved; and ‘ that a certain Person was carried thither in ‘ an Ark, which rested on the Top of it; the ‘ Reliques of the Timber whereof were preserved there a long time.” Besides these, *Josephus* tells us in the same Place, that *Hieronymus* the *Egyptian*, who wrote the *Phœnician Antiquities*, and *Mnaseas*, and many others, whose Words he alledges not, make mention of the Flood.

EUSEBIUS superadds two Testimonies more; the one of *Melon*, to this Effect: ‘ There departed from *Armenia*, at the time ‘ of the Deluge, a certain Man, who together ‘ with his Sons had been saved; who being ‘ cast out of his House and Possessions, was ‘ driven away by the Natives. This Man ‘ passing over the intermediate Region, came ‘ into the mountainous Part of *Syria*, that ‘ was then desolate.” This Testimony makes the Deluge Topical, and not to have reached *Armenia*.

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THE other is of *Abydenus* an ancient Writer, set down by *Eusebius*, *Præpar. Evangel. lib. 9. cap. 4.* Μεθ' οὗ ἄλλοι τε ἤρξαν, καὶ Σείσιθρος, ᾧ δὴ Κέρονος περσημαίνει μὲν ἔσσεσθαι πλῆθος ὀμβρῶν Δεσίῃς πέμπτη ἐπὶ δέκα, &c. 'After whom others reigned, and then *Sisithrus*, (so he calls *Noah*.) To whom *Saturn* foretold, that there should be a great Flood of Waters upon the fifteenth Day of the Month *Desius*; and commanded him to hide all Writings [or whatever was committed to writing] in *Heliopolis* of the *Syprians*: Which so soon as *Sisithrus* had performed, he presently sailed away to *Armenia*, where what God had predicted to him, immediately came to pass, [or came upon him.] The third Day after the Waters ceased, he sent forth Birds, that he might try whether they could espy any Land uncovered of Water: But they finding nothing but Sea, and not knowing whither to betake themselves, returned back to *Sisithrus*. In like manner, after some Days, he sent out others, with like Success. But being sent out the third time, they returned with their Feet fouled with Mud. Then the Gods caught up *Sisithrus* from among Men; but the Ship remained in *Armenia*, and its Wood afforded the Inhabitants Amulets to chase away many Diseases." These Histories accord with the Scripture as to the main, of the Being of a Flood, and *Noah* escaping out of it; only

only they adulterate the Truth, by the Admixture of a deal of fabulous Stuff.

CYRIL, in his first Book against *Julian*, to prove the Deluge, alledges a Passage out of *Alexander Polyhistor*, consonant to the preceding Words of *Abydenus*. ' *Plato* himself (saith he) gives us an obscure Intimation of the Deluge, in his *Timæus*, bringing in a certain *Egyptian* Priest, who related to *Solon* out of the Sacred Books of the *Egyptians*, that before the particular Deluges known and celebrated by the *Grecians*, there was of old an exceeding great Inundation of Waters, and Devastation of the Earth, which seems to be no other than *Noah's* Flood.

PLUTARCH, in his Book *De Solertia Animalium*, tells us, ' That those who have written of *Deucalion's* Flood, report, that there was a Dove sent out of the Ark by *Deucalion*, which returning again into the Ark, was a Sign of the Continuance of the Flood, but flying quite away, and not returning any more, was a Sign of Serenity, and that the Earth was drained.

INDEED, *Ovid*, and other Mythologists, make *Deucalion's* Flood to have been universal: And it's clear, by the Description *Ovid* gives of it, that he meant the general Deluge in the Days of *Noah*. And that by *Deucalion*, the Ancients, together with *Ovid*, understood *Noah*, *Kircher*, in his * *Arca Noë*, *L.2.c.5.

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doth well make out. First, For that the Poet *Apollonius* makes him the Son of *Prometheus*, in his third Book,

— ἐνθα Προμηθεὺς
Ἰαπετιονίδης ἀγαθὸν τέκε Δευκαλίωνα.

where *Prometheus*, the Son of *Japetus*, begat the renowned *Deucalion*. 2. *Berosus* affirms *Noah* to have been a *Scythian*: And *Lucian*, in his Book *De Dea Syria*, tells us, that many make *Deucalion* to have been so too. 3. The Scripture testifies, that Men were generally very corrupt and wicked in the Days of *Noah*. And *Andro Teius*, a very ancient Writer, testifies, that in *Deucalion's* time there was a great abundance of wicked Men, which made it necessary for God to destroy Mankind. 4. The Scripture saith, *That Noah was a just Man, and perfect in his Generation*. And *Ovid* saith of *Deucalion*, that,

*Non illo melior quisquam, nec amantior equi
Vir fuit, aut illa [Pyrrha uxore ejus] revere-
rentior ulla Deorum.*

And a little after,

Innocuos ambos, cultores numinis ambos.

5. *Apollonius* saith of *Deucalion*, Πρῶτος ἀνθρώπων ἐβασίλευσε, *He first ruled over Men*. Which may very well be attributed to *Noah*, the Father and Restorer of Mankind, whose Right

Right the Kingdom was. 6. The sending out of a Dove, to try whether the Waters were abated, and the Flood gone off, is (we have seen) by *Plutarch* attributed to *Deucalion*.

7. *Lucian*, in his *Timon*, and in his Book *De Dea Syria*, sets forth the Particulars of *Deucalion's*, after the Example of *Noah's Flood*.

Δευκαλίων ὁ μόνος ἀνθρώπων ἐλίπετο εἰς γενεὴν δευτέραν εὐβελίης τε καὶ τῆ εὐσεβείας ἕνεκα, &c.

Deucalion was the only Man that was left for a second Generation, for his Prudence and Piety sake; and he was saved in this manner: He made a great Ark, and got aboard it, with his Wife and Children: And to him came Swine, and Horses, and Lions, and Serpents, and all other living Creatures, which the Earth maintains, according to their Kinds, by Pairs; and he received them all, and they hurt him not; for there was, by Divine Instinct, a great Friendship among them; and they sailed together in the Ark, so long as the Waters prevailed. And, in his Timon, he saith, That Noah laid up in the Ark Plenty of all Provisions for their Sustenance.

PLINY saith of the City of *Joppa*, that it was built before the Flood.

By all this it appears, that the Notion of a general Flood was every where current among the People, especially in those Countries where the Ark rested, and where *Noah* afterwards lived. And hence it was, that the *Apameans*, whether of *Mesopotamia*, or *Syria*,

or *Bythinia*, (for there were three Cities of that Name) coined Moneys in Honour of the Emperors *Septimius Severus*, and *Philippus Arabs*, having on the Reverse the Figure of an Ark, with a Man and a Woman standing before it; and two Doves above it, one flying with a Branch of a Tree in its Mouth, another resting upon it. The Figures whereof, and a learned Discourse thereupon out of *Falconerius*, may be seen in *Kircher's*

*L.2.c.6. * *Arca Noë*. Which Moneys, though they were coined long after our Saviour's Time, and the Divulcation of the Scriptures; yet being done by Ethnicks, do shew that the Story of the Deluge was known, and famous, and generally credited among them, as being near the Place where *Noah* lived and conversed after the Flood.

HOWBEIT I do not deny, that there was such a particular Flood in *Thessaly*, as they call *Deucalion's*, which happened seven hundred and seventy Years, or thereabouts, after the general Deluge. I acknowledge also a more ancient Flood in *Attica*, in the Time of *Ogyges*, about two hundred and thirty Years before *Deucalion's*, by which the Country was so marred, that it lay waste and uncultivated, without Inhabitants, for almost two hundred Years.

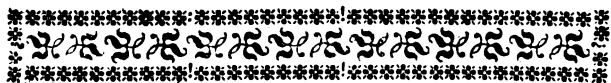




*The two ancient Apamian Coins taken out of
Octav. Falconieri de Nummo Apamensi Deuca-
lionæi Diluvij typum exhibente 8^o Romæ.*



*By the Greek inscriptions they were stamp^d
under Philippus Marcus Aurelius Alex-
ander and Septimius Severus*



C H A P. II.

Of the Causes of the Deluge.



WHAT were the instrumental Causes or Means of the Flood? Whether was it effected by natural or supernatural Means only? Whether was **GOD** no farther concerned in it, than in so ordering Second Causes at first, as of themselves necessarily to bring it in at such a time?

FIRST, Those that hold this Deluge was altogether miraculous, and that **GOD** Almighty created Waters on purpose to serve this Occasion, and, when they had done their Work, destroy'd them again, dispatch'd the Business, and loose or cut the Knot in a few Words. And yet this *Hypothesis* is not so absurd and precarious, as at first Sight it may seem to be: For the World being already full, there needed not, nor indeed could be any Creation of Water out of nothing, but only a Transmutation of some other Body into Water. Now, if we grant all Natural Bodies, even the Elements themselves, to be mutually transmutable, as few Men doubt, and some think they can demonstrate; why might not the Divine Power and Providence

bring together at that time such natural Agents, as might change the Air, or *Æther*, or both together, into Water ; and so supply what was wanting in Rains, and extraordinary Eruptions of Springs. To them that argue the Improbability of such a Change, from the great Quantity of Air requisite to the making of a little Water ; it may be answered, That if Air, and all Bodies commixt with it, were together changed into Water, they must needs make a Bulk of Water of equal Quantity with themselves, unless we will grant a Peripatetical Condensation and Rarefaction ; and hold that the same Matter may have sometimes a greater, sometimes a lesser Quantity or Extension.

To this may be replied ; If, indeed, the whole World were full of Body or Matter, a Deluge might easily be effected this way : It were but converting the Air and other Bodies mixt with it round the Terraqueous Globe, to the Height of 15 Cubits above the highest Mountains into Water, and the Business were dispatch'd.

BUT there is another Being in Nature besides Matter or Body, viz. a *Vacuum*, or empty Space, which is intermix'd with the minute Parts of all Bodies. Those that have more of it interspers'd among their Parts, are more rare or thin ; and those that have less, more dense or thick ; the rarer Bodies are also lighter, the more dense heavier, according

according to the Proportion of Matter they contain. Hence perchance a cubical Foot of Air may not be equal in Weight to the hundredth Part of a cubical Foot of Water; and consequently, an hundred cubical Feet of Air will be requisite to make, by Conversion, one cubical Foot of Water. I take it for granted here, that the different Weight of Bodies depends upon the Difference of Matter they contain, so that those which have fewest empty Pores are the heaviest, those that have most, the lightest.

THIS Cause [the Conversion of Air into Water] the Learned Jesuite *Athanasius Kircher*, in his Book *De Arca Noë*, alledges as the undoubted instrumental Cause or Means of the Deluge, in these Words; *Dico totum illud aëreum spatium usque ad supremam regionem aëris, præpotentis Dei virtute, in aquas, per inexplicabilem nubium coacervatarum multitudinem, quâ replebatur, conversam esse; cujus ubertas tanta fuit, ut Aer supremus cum inferiori in Oceanum commutatus videri potuerit, non naturæ viribus, sed illius cujus voluntati & imperio cuncta subsunt.* That is, I affirm, that all that Aëreal Space that reaches up to the supreme Region of the Air, was, by the Power of the Omnipotent GOD, and Instrumentality of an inexplicable Multitude of Clouds amassed together, wherewith it was filled, changed into Water, so that the upper and lower Air might seem to be transmuted

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* *Arca*
Noa, l. 2.
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into an Ocean, not by the Strength of Nature, but of Him to whose Will and Power all things are subject. And he is so confident * that this Deluge, in which the Water was raised fifteen Cubits above the highest Mountains, was not, nor could be effected by natural Causes, but by the Right Hand of the most High God only; that he saith, 'No Man can deny it, but he who doth not penetrate how far the Power of Nature can extend, and where it is limited.' To conclude, this *Hypothesis* hath the Suffrages of most learned Men. But, because the Scripture, assigning the Causes or Means of the Inundation, makes no Mention of any Conversion of Air into Water, but only of the Breaking up the Fountains of the Great Deep, and the Opening of the Windows of Heaven, I suppose those Causes may be sufficient to work the Effect, and that we need not have recourse to such an Assistance.

* *Dr. Bur-*
net.

As for those that make the Deluge Topical, and restrain it to a narrow Compass of Land, their Opinion is, I think, sufficiently confuted by a late ingenious * Author, to whom, therefore, I refer the Reader.

I SHALL not undertake the Defence or Confutation of those, or any other *Hypothesis*; only tell you which, at present, seems to me most probable; and that is theirs, who for a Partial Cause of the Deluge, assign either a Change of the Center of the Earth, or a violent

lent Depressi^on of the Surface of the Ocean, and a Forcing the Waters up from the subterraneous Aby^ss through the Channels of the Fountains that were then broken up and opened.

FIRST then, let us consider what Causes the Scripture assigns of the Flood; and they are two. 1. The Breaking up the Fountains of the great Deep. 2. The Opening of the Windows of Heaven. I shall first treat of this last. By the Opening of the Windows of Heaven, is (I suppose) to be understood the Causing of all the Water that was suspended in the Air to descend down in Rain upon the Earth; the Effect hereof here mentioned being a long continuing Rain of forty Natural Days; and that no ordinary one neither, but Catarracts or Spouts of Water; for so the *Septuagint* interpret the *Windows of Heaven were opened*. *Καὶ αἱ καταρρακταὶ τῆ ἐρανεῖ ἠνεώχθησαν.* *The Catarracts or Spouts of Heaven were opened.* And that these Treasuries of the Air will afford no small Quantity of Water, may be made appear, both by Scripture and Reason. 1. By Scripture, which opposes the Waters that are above the Heavens or Firmament, to those that are under them; which if they were not ἰσόρροπα, and in some Measure equal, it would never do. *Gen. i. 6. GOD is said to make a Firmament in the midst of the Waters, and to divide the Waters which were und^r the Firmament,*

ment, from the Waters which were above the Firmament. And this was the Work of a whole Day, and consequently no inconsiderable thing. 2. The same may be made appear, by Reason grounded upon Experience. I myself have observed a Thunder-Cloud in Passage, to have in less than two Hours Space poured down so much Water upon the Earth, as, besides what sunk into the parched and thirsty Ground, and filled all Ditches and Ponds, caused a considerable Flood in the Rivers, setting all the Meadows on float. [And Dr. *Wittie*, in his *Scarborough Spaw*, tells us of great Spouts of Rain that ordinarily fall every Year, some time or other, in Summer, that set the whole Country in a Flood.] Now had this Cloud, which might, for ought I know, have moved forty Miles forward, stood still and emptied all its Water upon the same Spot of Ground it first hung over, what a sudden and incredible Deluge would it have made there? and yet what Depth or Thickness of Vapours might remain uncondensed in the Air above this Cloud, who knows? That the Ocean afforded but little, appears in that the Vapours raised out of it, and brought up in Clouds, and poured down upon the Earth in Rain, are shortly carried off by the Rivers, and reassumed into the Sea: But if the Waters of the Flood encompassed the whole Terraqueous Globe, (as is most probable) then the Ocean

Ocean contributed nothing; for the Water must be raised higher above the *Superficies* of the Ocean, than that of the dry Land; upon which yet, at the end of the forty Days Rain, the Waters were so high as to bear up the Ark, that it touched not the Ground.

MOREOVER, after this forty Days violent and impetuous Rain, it is probable, that it rained, though more gently and interruptedly, till the 150th Day, because till that time the Waters prevailed and encreased upon the Earth. All this Water that fell in Rain, must be contained in the vast Treasuries of the Middle and Superior Air, or else immediately created by GOD.

If the whole Ocean indeed were raised up in Vapour, and that Vapour condensed into Rain, and poured forth upon the dry Land, and there suspended and miraculously stopped from going off by the Almighty Power of GOD, then might it, together with an equal Quantity of Water raised up from the great Deep, have a considerable Interest in the Deluge. But of this there cannot be any Proof gathered from the Scriptures.

I RETURN now to the first Cause or Means of the *Deluge* assigned by the Scripture, and that is, the *Breaking up of all the Fountains of the great Deep*. By the great Deep, in this Place, I suppose, is to be understood the subterraneous Waters, which do and must necessarily communicate with the Sea. For we see,

see, that the *Caspian*, and some other Seas, receive into themselves many great Rivers, and yet have no visible Outlets; and therefore, by subterraneous Passages, must needs discharge their Waters into the Abyss of Waters under the Earth, and by its Intervention into the Ocean again.

THAT the *Mediterranean* Sea doth not (as I sometimes thought) communicate with the *Ocean* by any subterraneous Passages, nor thereby impart any Water to it, or receive any from it, may be demonstrated, from that the *Superficies* of it is lower than the *Superficies* of the Ocean, as appears from the Waters running in at the Streights of *Gibraltar*; for if there were any such Communications, the Water keeping its Level, the *Mediterranean*, being the lowest, must by those Passages receive Waters from the *Ocean*; and not the *Ocean*, which is (as we have proved) the highest from the *Mediterranean*. But that it doth not receive any by subterraneous Passages, is most likely, because it receives so much above Ground. Hence it necessarily follows, that the *Mediterranean* spends more in Vapour than it receives from the Rivers, which is Mr. *Halley's* Conclusion; though in some of his Premises, or *Hypotheses*, he is, I think, mistaken: As, 1. In that he numbers the *Tiber* amongst his nine great Rivers, each of which may yield ten times as much Water as the *Thames*, whereas

whereas I question whether that yields once so much: And whereas he passes by all the rest of the Rivers as smaller than it, there are two that I have seen in *Italy* itself, whereof the one, *viz.* the *Arnus*, on which *Florence* and *Pisa* stand, seemed to me not inferior in Bigness to the *Tiber*; and the other, *viz.* the *Athesis*, on which *Verona* stands, I could not guess to be less than twice as big. 2. In that he thinks himself too liberal in allowing these nine Rivers to carry down each of them ten times so much Water as the *Thames* doth. Whereas one of those nine, and that none of the biggest neither, *viz.* the River *Po*, if *Ricciolus* his *Hypotheses* and Calculations be good, affords more Water in an Hour, than Mr. *Halley* supposes the *Thames* to do in a Day; the hourly Effusions of the *Po* being rated at eighteen Millions of Cubical Paces, by *Ricciolus*; whereas the daily ones of the *Thames* are computed to be no more than twenty five Millions, three hundred forty four thousand Cubical Yards of Water, by Mr. *Halley*; but a Geometrical Pace contains five Feet, *i. e.* $1\frac{1}{3}$ of a Yard. Now if the *Po* pours so much Water hourly into the Sea, what then must the *Danow* and the *Nile* do? each of which cannot (I guess) be less than treble of the *Po*. *Tanais*, *Borysthenes*, and *Rhodanus*, may equal, if not exceed it. Howbeit, I cannot approve *Ricciolus* his *Hypotheses*, judging them

them to be too excessive, but do believe that as to the whole, Mr. *Halley* comes nearer the Truth. Sure enough it is, that in the *Mediterranean*, the Receipts from the Rivers fall short of the Expence in Vapour; though in Part of it, that is, the *Euxine*, the Receipts exceed, as appears from that there is a constant Current sets outward from thence through the *Thracian Bosphorus*, and *Hellspont*.

BUT though the *Mediterranean* doth indeed evaporate more than it receives from the Rivers, yet, I believe, the Case is not the same with the *Caspian* Sea; the *Superficies* whereof seems to me not to bear any greater Proportion to the Waters of the Rivers that run into it, than that of the *Euxine* doth to its; which we have observed not to spend the whole Receipt in Vapour.

You will say, Why then do not great Floods raise the Seas? I answer, as to the *Caspian*, if it communicates with the Ocean, whether the Rivers bring down more or less, it's all one; if more, then the Water keeping its Level, the *Caspian* raiseth the Ocean; if less, then the Ocean communicates to the *Caspian*, and raises that. But as to the *Mediterranean*, we may say, that when it receives more on the one Side, it receives less on the other, the Floods and Ebbs of the *Nilus*, and the other Rivers, counterbalancing one another: Besides, by reason of the Snows lying upon

upon the Mountains all Winter, the greatest Floods of those great Rivers in *Europe* do not happen when the *Mediterranean* evaporates least in the Winter-time, but in the Spring.

Y o u will demand farther, if the *Mediterranean* evaporates so much, what becomes of all this Vapour? I answer, It is cast off upon the Mountains, and on their Sides and Tops is condensed into Water, and so returned again by the Rivers unto the Sea.

I f you proceed to ask what becomes of the Surplusage of the Water, which the *Mediterranean* receives from the *Ocean*, and spends in Vapour; I answer, It seems to me that it must be cast farther off over the Tops of the Mountains, and supply in part Rain to these Northern Countries; for we know that the South Wind brings Rain with us, and all *Europe* over.

Mudidis Notus evolat alis. Ovid. *Metam.*

As to the great Ocean, I do not believe that it evaporates so much as the *Mediterranean*: Both, 1. Because the whole *Mediterranean*, excepting the *Euxine*, lies in a hot Climate, and a great Part of it as it were in a Valley, Ridges of high Mountains, *Atlas* on one Side, and the *Alps* and *Appennine*, &c. on the other running along it. And, 2. Because the Surface of the whole *Ocean* bears a greater Proportion to the Waters it receives from

from the Rivers of at least this Continent, than that of the *Mediterranean* doth to its. And therefore I think also that Mr. *Halley* exceeds in his Estimate of the Heat of the *Superficies* of the Sea Water. I cannot persuade myself, that were it all commixt, I mean the hotter Part with the cooler, all the Surface over to such a Thickness, it would equal the Heat of our Air in the hottest time of Summer. But I leave that to farther Tryal and Enquiry.

HERE give me leave to suggest, that we are not to think, that all the Vapours that supply our Rains and Dews proceed from the Sea; no, a great Part of them, *viz.* all that, when condensed, waters the Earth, and serves for the Nutrition of Plants and Animals, (if not the same individual Water, at least so much) was exhaled out of the Earth before, and returned again in Showers and Dews upon it: So that we receive no more from the Sea, than what the Rivers carry back, and pour into it again. But supposing Mr. *Halley's Hypotheses* to be good, and that the *Ocean* doth evaporate, and cast off to the dry Land $\frac{2}{3}$ of an Inch Thickness daily, and this suffices for the Supply of all the Rivers; how intolerably extravagant must their *Hypotheses* be, who suppose the Rivers of all the World together to yield half an Ocean of Water daily? Though I must confess myself to be at a Loss, as to those vast Rivers of *America* of

of ninety Miles broad ; for if they should run with any thing a swift Current, it is indeed inestimable what a Quantity of Water they may pour forth. All, therefore, that I have to say to them, is, That we want a true History and Account of their *Phænomena*, from their Fountains to their Outlets.

BUT in contradiction to what I have said, concerning the Water keeping its Level, and flowing in only at the *Straits-Mouth*, I understand, that it is the concurrent and unanimous Vote and Suffrage of Mariners, Voyagers, and Philosophers, that there is an Under-Current at the Straits of *Gibraltar*, the *Thracian Bosphorus*, and the *Baltick Sound*. Particularly, *M. Marsilly* affirms, That the lower Water in the Channel of the *Thracian Bosphorus* is driven Northward into the *Euxine Sea*, whilst the upper flows constantly from the *Euxine* Southward : And, That that which flows from the South is saltier and heavier ; which he found by letting down a Vessel close shut up, fitted with a Valve to open at pleasure, and let in the lowest Water, which being brought up and weighed, was observed to be ten Grains heavier than the upper. That the upper and lower flows contrary ways, he found by the Fishermens Nets, which being let down deep from Vessels that were fixed, were always, by the Observation of the Fishermen, by the Force of the Current driven towards the *Black Sea*,

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and by the letting down of a Plummert ; for if it were stopp'd and detain'd at about five or six Foot depth, it did always decline towards the *Marmora* or *Propontis* ; but if it descended lower, it was driven to the contrary part, that is, the *Euxine*. But, I think, these Experiments are not sufficient to establish and demonstrate such an Under-Current, because, possibly there might be some Mistake in them : And Mr. *Smith* mentions no such thing as any Under-Current there. But yet the same Mr. *Smith* endeavours to prove an Under-Current, by two Experiments : The first is, the Running-Tide and Half-Tide in the *Offing*, between the *North-Foreland* and *South-Foreland*. Now where it flows Tide and Half-Tide, though the Tide of Flood runs aloft, yet the Tide of Ebb runs under-foot, that is, close by the Ground. See *Philosophical Transactions*, Numb. 158. p. 564.

THE second is, an Experiment made in the *Baltick Sound* : In one of the King's Fregats they went with their Pinnace into the middle Stream, and were carried violently by the Current : Soon after, they sunk a Bucket with a large Cannon Bullet, to a certain Depth of Water, which gave check to the Boat's Motion ; and sinking it still lower and lower, the Boat was driven ahead to Windward against the Upper-Current, the Current aloft being not above four
or

or five Fathom deep; and the lower the Bucket was let fall, they found the Under-Current the stronger.

To all this I reply; That I do not understand how Waters can run backward and forward in the same Channel, at the same time. For there being but one Declivity; this is as much to affirm, as that a heavy Body should ascend. It is a Crossing of Proverbs, *Ἀνὰ ποταμῶν*, making Rivers ascend to their Fountains, affirming that to be done, which all the World hitherto hath look'd upon as absurd and impossible. And, therefore, the Matter of Fact had need be well attested: Which, when to me it shall be, I must then, *manas dare*, yield up the Bucklers, and study some Means to solve the *Phænomena*.

SUPPOSE we, that the *Mediterranean* empties itself into the Ocean by an Under-Current; there must be a Declivity to carry it down, and, consequently, the upper Superficies of this Under-Current must have its Declivity too, and likewise the contiguous Superficies of the Upper-Current; and so, the Upper-Current must needs ascend in its Course inwards. If you say, it's forc'd in by the Motion of the Ocean, that seems unlikely, because it runs in constantly; as well Ebb as Flood. And, therefore, there seems to be no better Account of it than the Superficies of the *Ocean* being higher than that of the *Mediterranean*.

BUT to put this Matter out of all doubt, that learned and curious Observer of all Natural and Artificial Rarities that came in his way, Mr. *John Greaves*, in whose time there was no talk of an Under-Current at the *Straits-Mouth*, but of contrary-side ones, affirms of his own Knowledge and Observation, *That it was a great Mistake, and that there was no such thing as a contrary Current, but that the Water flowed equally inward, as well on the one side of the Channel as on the other.* *Pyramidograph. p. 101, 102.*

By the Breaking up of the Fountains of the *Great Deep*, is, I conceive, meant, the making great Issues and Apertures for these subterraneous Waters to rush out. You will say, how could that be, sith the Water keeps its Level, and cannot ascend to a greater Height above the common Center, than the Superficies of the Sea is, much less force its Way, remove Obstacles, and break open Passages?

ANSWER, According to them that hold that all Rivers come from the Sea by subterraneous Passages, it is no more than daily happens. For they must needs grant, that the Water in subterraneous Channels, is raised as far above the Level of the Ocean, as are the Heads and Fountains of great Rivers. Which, considering the Height of their first Springs up the Mountains, the Length of their Courses, and the Swiftnes of their Streams

Streams for a great part of the Way, is very considerable, a constant Declivity being necessary to their Descent. And, therefore, I can by no means assent to the Learned Doctor Plot, (if I understand him aright) * *That the Valleys are as much below the Surface of the Sea, as Mountains are above it.* For, * Hist. Nat. Stafford, p. 79. how then could Rivers descend down to the Sea through those Valleys? The Sea would rather run into them, and make *Sinus's*; or else, if they were enclosed, the Water would stagnate there, and make Pools.

If this be done by way of Filtration (which seems to be the most likely Means of raising the Water) I do not see, but these Filters may suck up the whole Ocean; and if Apertures and Outlets large enough were made, pour it out upon the Earth in no long time. But I cannot be fully reconciled to this Opinion, though it hath great Advocates, especially the fore-mentioned very learned and ingenious Person, Dr. Robert Plot. I acknowledge subterraneous Waters: I grant a Confluence and Communication of Seas by Under-ground Channels and Passages: I believe, that wherever one shall dig as deep as the Level of the Sea, he shall seldom fail of Water; the Water making its way through Sand, and Gravel, and Stones. In like manner, as it is observed of the River *Seine*, that in Flood-times all the neighbouring Wells and Cellars are filled with Water, and when the River

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decreases and sinks again, those Waters also of the Wells and Cellars diminish, and by degrees fall back into the River, so that there are scarce any Wells or Fountains in the Plains near the River, but their Waters keep the Level of the Rivers, rising and falling with it.

BUT this inferior constant Circulation and perpetual Motion of Water, seems to me not yet sufficiently proved and made out. I think that the Patrons and Abettors of this Opinion, have not satisfactorily demonstrated, how it is, or can be performed. To what is offered concerning the Center of Gravity being nearer to our Continent, by reason of the Preponderancy of the Earth, and the Waters lying, as it were, on an Heap in the other Hemisphere, I answer, 1. That in the present terraqueous Globe, the *New World*, which lies between the two great Seas, and almost opposite to our Continent, doth in some measure counterpoise the *Old*, and take off a great part of the Advantage, which, by reason of its Preponderancy, it might otherwise have. Moreover, I am of Mr. *Brierwood's* Opinion, that there may be, and is a vast Continent toward the Southern Pole, opposite to *Europe* and *Asia*, to counterpoise them on that side; nay, I do verily believe, that the Continents and Islands are so proportionably scattered and disposed all the World over, as if not perfectly and exactly, yet

yet very nearly to counter-balance one another; so that the Globe cannot walter or reel towards any Side: And that the Center of the Convex *Superficies* of the Sea, is the true Center of the whole Terrestrial Sphere, both of Motion, and of Gravity. I add also of Magnitude, which is exceedingly convenient, as well for the Facility as the Equality of the Earth's Diurnal Motion. This *Hypothesis* of the Continent's being dispers'd equally on all Sides of the Globe, makes these Centers concurr in one Point, whatever Cause we assign of the raising up the dry Land at first. Whereas if we should suppose the dry Land to have been raised up by Earthquakes only on one Side of the Globe, and to have cast off the Water to the other, and also that the Waters could find no Way into the Caverns that were left within; then the watery Side must needs preponderate the Land Side, and bring the Center of Gravity nearer to its own *Superficies*, and so raise the Land still a great deal higher, and make a considerable Distance between the Centers of Magnitude, and of Gravity. In our *Hypothesis* of the equal Dispersion of the Continents and Islands, no such thing would happen, but each Continent, taking it with all its internal Caverns, whether lighter or heavier than its Bulk in Water, that is, whether the Water did make its way into the Caverns thereof, or did not, (for in the first Case it would be

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heavier, in the second lighter) would have its Counterpoise on the opposite Side, so that the Centers would still concur. The Case would be the same, if the dry Land were discovered, and the Mountains raised by the immediate Application of the Divine Power.

2. The Sea being no where above a *German* Mile deep, (for which we have good Authority) in most Places not half so much, taking then, as a Middle Term, half a Mile. Suppose it every where half a Mile deep; (the Earth below the Sea, we have no reason to suppose of different Gravity) what Proportion hath this half Mile's Thickness of Water to the whole Terraqueous Globe, whose Semidiameter is, by the Account of Mathematicians, Three thousand four hundred and forty *Italian* Miles? What little Advantage then can it have of the Earth opposite to it, in Point of Preponderancy? 3. Granting the Center of Gravity should be nearer our Continent: The Center being the lowest Place, and the Water a fluid Body, unless stopped, (which it might indeed be, if it were encompassed round with high Shores, as high as the Mountains, without any Breaks or Outlets in them) where it found Declivity, it would descend as near as it could to it, without any Regard of the Earth's Preponderancy. And though we should grant, that the Dryness of the Shores might stop it, and cause it to lie on a Heap, yet would it run up the

the Channels of Rivers, till it come as near as possible to the Center of Gravity. Indeed the Rivers themselves could not descend, but must run towards the Middle of the Continent. All this, I think, will follow from this *Hypothesis* by as good Consequence, as the Waters being forced through the subterraneous Channels out at the Springs. Dr. *Hook's* Opinion, That the Preponderancy of the salt Water above the fresh, raises up the fresh Water above the Level of the salt, as high as the Springs and Fountain-Heads, and forces it out there, would have a great Probability in it, were there continued strait Channels or Conduits from the Bottom of the Sea to the Eruption of Springs, which I believe there are not. I do not peremptorily affirm, that all Fountains do proceed from Rain; only I contend, that Rain may suffice to feed them, and that probably it doth feed ordinary Springs. This the ingenious *French* Author doth well demonstrate in the River *Seine*, and I believe it is demonstrable in most other Rivers.

THE little Brook that runs near my Dwelling, and hath its Head or Source not above four or five Miles off, where there is no extraordinary Eruption of Water, all along its Course receives small Rivulets on both Sides; which though they make a considerable Stream at five Miles Distance from the Fountain-Head, yet singly are so small, that they
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may very well be conceived to drain down from the higher Grounds that lie about them. And taking the whole together, it is a very considerable Length and Breadth of Land, that contributes to the Maintenance of this little River : So that it may easily be believed, that all its Water owes its Original to Rain : Especially, if it be considered farther, that in Winter-time, after the Rains are fallen, the Ground sated, and the Ditches full, the Stream of this River, during the whole Winter following, is for the most part, unless in Frosts, double of what it was in Summer. Which Excess can proceed from nothing but Rain and Mists ; at least it would be Rashness to assign any other Cause, when there is so obvious and manifest an one. Moreover, that Rain affords no small Quantity of Water, is clear also from great Floods, wherein it might be proved, that in few Days there descends more Water than would supply the ordinary Stream for a good part of Summer. Now, to compare great Things with small ; I have seen many of the biggest Rivers in *Europe*, the *Danow*, *Rhine*, *Rhosne*, and *Po* ; and when I consider the Length of their Courses, the Multitude of considerable Rivers and Brooks they receive ; and all these from their first Rise, made up by Degrees of little Rivulets and Gills, like my neighbouring Brook ; the huge Mountains and vast Extent of higher Grounds

Grounds they drain : To me it seems (and I have seen all their Streams near their Outlets, except the *Danaw's*, and its after four hundred Miles Descent) that they do not bear any greater Proportion to the Rivers and Rivulets they receive, and the immense Tracts of Land that feed them, than my Brook doth to its small Rills and Compass of Ground.

BUT in this, I confess, I do not descend to the Niceness of Measuring and Calculation, but satisfy myself with rude Conjectures, taking my Measures, as the *Cestrians* say, by the Scale of the Eye.

IT will here be objected, *That the Rain never sinks above ten Foot deep at most into the Earth, and therefore cannot supply the Springs.*

Ans^r. THIS indeed, if it were true, would much enervate, nay, quite overthrow our Opinion : And therefore we must fortify this Point, and effectually demonstrate, beyond all Possibility of Denial or Contradiction, *That Rain-water doth sink down, and make its Way into the Earth; I do not say, ten, or twenty, nor forty, but an hundred, nay, two or three hundred Foot, or more.*

FIRST then, in *Pod-Hole*, in the Peak of *Derbyshire*, there are in some Places constant Droppings and Destillations of Water from the Roof : Under each of which (to note that
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by the by) rises up a Stone Pillar, the Water precipitating some of those stony Particles, which it had washed off the Rocks in passing through their Chinks. These Droppings continue all the Summer long. Now it seems clear to me, that the Rain-water making its Way through the Veins and Chinks of the Rocks above it, and yet but slowly, by reason of the Thickness of the Mountain, and Straitness of the Passages, supplies that Dropping all the Year round; at least, this is much more rational than any different *Hypothesis*. If the Water distills down faster in Winter-time and wet Weather, than it doth in Summer (which I forgot to ask) the Experiment would infallibly prove our Assertion. In Confirmation of this Argument, *Albertus Magnus* (as I find him quoted in *Dr. Wittie's Scarborough Spa*) tells us, *That at the Bottom of a solid Rock one hundred and thirty Fathoms deep, he saw Drops of Water distilling from it in a rainy Season.*

SECONDLY, It is well known, and attested to me by the People at *Buxton* when I was there, That out of the Mouth of the same *Pool-Hole*, after great and long continuing Rains, a great Stream of Water did usually issue forth: And I am sure it must make its Way through a good Thickness of Earth, or Rocks, before it could come in there.

THIRDLY, What becomes of all the Water that falls on *Newmarket-Heath*, and *Gogmagog Hills*,

Hills, I presume also *Salisbury-Plain*, and the like spongy Grounds all Winter long, where we see very little run off any way? It must needs sink into the Ground more than ten Foot deep.

FOURTHLY, Many Wells, whose Springs lie at least twenty Foot deep, we find by Experience, do often fail in great Droughts in Summer-time.

FIFTHLY, In Coal Delfs, and other Mines, in wet Weather the Miners are many times drown'd out, (as they phrase it) though no Water runs down into the Mouths of their Pits or Shafts. Nay, Dr. *Wittie* tells us, in his *Description of the Vertues of the Scarborough Spaw*, pag. 105. That after great Inundations of Rain, the Miners find the Water frequently distilling through the solid Earth upon their Heads; whereas in Summer, or dry Seasons, they find no Interruption from thence at all.

FARTHER, to confirm this Particular, I wrote to my Honoured Friend Sir *Thomas Willughby*, Bar. desiring him to examine his Colliers concerning it, and send me Word what Report they make; and from him received this Account: If there be Springs lie before you come at the Coal, they carry the Water away; but if there be none, it falls into the Works in greater or less Quantity, according as the Rains fall. Which Answer is so much the more considerable, in that it gives

gives me a farther clear Proof, that Springs are fed by Rain-water, and not by any Communications from the Sea; their Original being above the Beds of Coal, they receiving the Rain-water into their Veins, and deriving it all along to their Fountains or Eruptions, above the Coals.

I MIGHT add out of him, [Dr. Wittie] Fifthly, p. 85. *That the Scarborough Spaw, notwithstanding it breaks out of Ground within three or four Yards off the Foot of the Cliff, which is near forty Yards high, and within a Quarter of a Mile there is another Hill, that is more than as high again as the Cliff, and a Descent all the way to the Cliff, so as the Rain-water cannot lie long upon the Ground; yet it is observable, that after a long Rain, the Water of the Spaw is altered in its Taste, and lessened in its Operation; whereas a rainy Day or two will not sensibly hurt it.* And now I am transcribing out of this Author, give me Leave to add an Observation or two in Confirmation of Rains being the Original of Springs. The first is (pag. 97.) this:

In England, in the Years 1654, 55, and 56. when our Climate was drier than ever it had been mentioned to be in any Stories, so as we had very little Rain in Summer, or Snow in Winter, most of our Springs were dried up, such as in the Memory of the eldest Men living had never wanted Water, but were of those Springs we call Fontes Perennes, or at least

least were esteemed so. He instances also a parallel Story out of Heylin's Geography, in the Description of Cyprus, where the Author relates; *That in the Days of Constantine the Great, there was an exceeding long Drought there, so as in thirty six Years they had no Rain, insomuch as all the Springs and Torrents, or Rivers, were dried up; so that the Inhabitants were forced to forsake the Island, and to seek for new Habitations for want of fresh Water.*

THE second is, p. 84. *That in the Wolds or Downs of Yorkshire they have many Springs break out after great Rains, which they call Gypfies, which jet and spout up a great Height.*

Neither is this Eruption of Springs after long Rains, proper and peculiar only to the Wolds of Yorkshire, but common to other Countries also, as Dr. *Childrey witnesseth, in these Words: *Sometimes there breaks out Water in the manner of a sudden Land Flood, out of certain Stones, that are like Rocks standing aloft in open Fields, near the Rising of the River Kyhet [in Kent] which is reputed by the common People a Fore-runner of Dearth. That the sudden Eruption of Springs in Places where they use not always to run, should be a Sign of Dearth, is no Wonder. For these unusual Eruptions, (which in Kent we call Nailbourns) are caused by extreme Gluts of Rain, or lasting wet Weather, and never hap-*
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pen but in wet Years; witness the Year 1648. when there were many of them; — and to our Purpose very remarkable it was, that in the Year 1654. several Springs and Rivulets were quite dried up, by reason of the precedent Drought, which raged most in 1651, 1652, and 1653. As the Head of the Stour, that rises near Eltham in Kent, and runs through Canterbury, was dry for some Miles Space: And the like happened to the Stream that crosseth the Road-way between Sittingburn and Canterbury, at Ospring near Feverham, which at other times ran with a plentiful Current, but then wholly failed. So we see that it is not infrequent for new Springs to break out in wet Years; and for old ones to fail in great Droughts. And Strabo, in his first Book out of *Xanthus the Lydian*, tells us, *That in the Time of Artaxerxes, there was so great a Drought, that Rivers, and Lakes, and Wells of Water failed, and were dried up.*

I CANNOT here also forbear to add, the probable Account he [Dr. Wittie] gives of the Supply of the Spring-Well on the Castle-Hill at Scarborough; at which, I confess, I was somewhat puzzled. *This Well*, saith he, *though it be upon the Top of the Rock, not many Yards deep, and also upon the Edge of the Cliff, is, doubtless, supplied by secret Channels within the Ground, that convey the Rain and Showers into it, being placed on a dependent Part of the Rock; near unto which, there are also Cellars*

lars under an old ruined Chappel, which, after a great Rain, are full of Water, but are dried up in a long Drought.

As for what is said concerning the River *Wogla's* pouring out so much Water into the *Caspian Sea*, as in a Year's time would make up a Mass of Water equal to the Globe of the Earth; and of the hourly Effusions of the River *Po* in *Italy*, which *Ricciolus* hath computed to amount to 18000000 cubical Paces of Water; whence a late learned Writer hath probably inferred, that all the Rivers in the World together, do daily discharge half an Ocean of Waters into the Sea; I must confess myself to be unsatisfied therewith. I will not question their Calculations, but I suspect they are out in their *Hypotheses*.

THE Opinion of Mr. *Edmund Halley*, that Springs and Rivers owe their Original to Vapours condensed on the Sides of Mountains, rather than unto Rains, I acknowledge to be very ingenious, grounded upon good Observations, and worthy of its Author; and I will not deny it to be in part true, in those hot Countreys in the Torrid Zone, and near it; where, by reason of the great Heats, the Vapours are more copiously exhaled out of the Earth, and, it's likely, carried up high in the Form of Vapours. The inferiour Air, at least, is so charged with them, and by that means so very moist, that, in some Places,

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their Knives rust even in their Pockets; and in the Night, so very fresh and cold, partly also by reason of the Length of the Nights; that exposing the Body to it, causes Colds and Catarrhs, and is very dangerous: Whence also their Dews are so great, as in good measure to recompense the Want of Rain, and serve for the Nourishment of Plants; as they do even in Spain itself.

I SHALL first of all propose this Opinion in the Words of the Author, and then discourse a little upon it. After he had enumerated many of the high Ridges and Tracts of Mountains in the four Quarters of the World, he thus proceeds: *Each of which far surpass the usual Height to which the aqueous Vapours of themselves ascend, and on the Tops of which the Air is so cold and rarified, as to retain but a small Part of those Vapours that shall be brought thither by the Winds. Those Vapours, therefore, that are raised copiously in the Sea, and by the Winds, are carried over the low Lands to those Ridges of Mountains, and are there compelled, by the Stream of the Air, to mount up with it to the Tops of the Mountains, where the Water presently precipitates gleeting down by the Crannies of the Stone; and part of the Vapour entring into the Cavities of the Hills, the Water thereof gathers, as in an Alembick, into the Basons of Stone it finds; which being once filled, all the Overplus of Water that comes thither, runs over by the lowest Place,*
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and breaking out by the Sides of the Hills, forms single Springs. Many of these running down by the Valleys, or Guts, between the Ridges of the Hills, and coming to unite, form little Rivulets or Brooks. Many of these, again, meeting in one common Valley, and gaining the plain Ground, being grown less rapid, become a River: And many of these being united in one common Channel, make such Streams, as the Rhine, and Rhosne, and the Danube; which latter one would hardly think the Collection of Water condensed out of Vapour, unless we consider how vast a Tract of Ground that River drains, and that it is the Sum of all those Springs, which break out on the South-side of the Carpathian Mountains, and on the North-side of the immense Ridge of the Alps, which is one contained Chain of Mountains from Switzerland to the Black Sea. And it may almost pass for a Rule, that the Magnitude of a River, or the Quantity of Water it evacuates, is proportionable to the Length and Height of the Ridges, from whence its Fountains arise. Now this Theory of Springs is not a bare Hypothesis, but founded on Experience, which it was my Luck to gain in my Abode at S. Helena; where, in the Night-time, on the Tops of the Hills, about Eight hundred Yards above the Sea, there was so strange a Condensation, or rather Precipitation of the Vapours, that it was a great Impediment to my Celestial Observations; for, in the clear

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Sky, the Dew would fall so fast, as to cover each half-quarter of an Hour my Glasses with little Drops, so that I was necessitated to wipe them off so often; and my Paper, on which I wrote my Observations, would immediately be so wet with the Dew, that it would not bear Ink: By which it may be supposed, how fast the Water gathers in those mighty high Ridges I but now named. ----- At last he concludes: And I doubt not but this Hypothesis is more reasonable, than that of those who derive all Springs from the Rain-waters, which yet are perpetual, and without Diminution, even when no Rain falls for a long space of Time.

THIS may, for ought I as yet see or know, be a good Account of the Original of Springs in those fervid Regions, though even there, I doubt, but partial; but in *Europe*, and the more temperate Countries, I believe the Vapours in this manner condensed, have but little Interest in the Production of them, though I will not wholly exclude them. For,

First, The Tops of the *Alps* above the Fountains of four of the greatest Rivers in *Europe*, the *Rhine*, the *Rhofne*, the *Danow*, and the *Po*, are, for about six Months in the Year, constantly covered with Snow, to a great thickness; so that there are no Vapours all that while that can touch those Mountains, and be by them condensed into Water; there falls nothing there but Snow, and

and that continuing all that while on the Ground without Dissolution, hinders all Access of Vapours to the Earth; if any rose, or were by Winds carried so high in that Form, as I am confident there are not. And yet, for all that, do not those Springs fail, but continue to run all Winter; and it is likely too, without Diminution; which is a longer time than Droughts usually last; especially, if we consider that this Want of Supply is constant and annual; whereas, Droughts are but rare and accidental. So that we need not wonder any more, that Springs should continue to run, and without Diminution too, in times of Drought. True it is, that those Rivers run low all Winter, so far as the Snow extends, and to a good distance from their Heads; but that is for want of their accidental Supplies from Showers. Nay, I believe, that even in Summer, the Vapours are but rarely raised so high in a liquid Form in the free Air, remote from the Mountains, but are frozen into Snow, before they arrive at the Height. For the *Middle Region* of the *Air*, where the Walk of the Clouds is, at least the superiour part of it, is so cold, as to freeze the Vapours that ascend so high, even in Summer-time. For we see, that in the Height and Heat of Summer, in great Thunder-storms, for the most part it hails: Nay, in such Tempests I have seen mighty Showers of great Hail-stones fall, some as big as

Nutmegs or Pigeons Eggs; and in some places, such Heaps of them, as would load Dung-Carts, and have not been dissolved in a day or two. At the same Seasons, I have observed, in some Showers, Hail-stones fall of irregular Figures, and throughout pellucid, like great Pieces of Ice, with several Snags or Fangs issued out of them: Which, how they could be supported in the Air till they amounted to that Bulk and Weight, is a thing worthy to be more curiously considered. For either they must fall from an incredible Height, the Vapours they encountred by the Way, condensing, and, as it were, crystallizing upon them into Ice, and in time augmenting them to that Bulk; or else, there must be some strange and unknown Faculty in the Air to sustain them. That the superiour Air doth support heavy Bodies better than the inferiour, the Flight of Birds seems to be a clear Demonstration. For, when they are mounted up on High, they fly with less Fatigue, and move forward with greater Facility, and are able to continue longer upon the Wing without Delassation, than in the lower Air they could possibly do. And, therefore, when they are to make great Flights, they soar aloft in the Air, at a great Height above the Earth. So have I often seen a Flock of Wild-geese mounted so high, that though their Flight be swift, they seemed to make but little Way in a long time, and to pro-

proceed on their Journey with ease, and very leisurely, by reason of their Distance. And yet one would think, this were contrary to Reason, that the lighter Air, such as is the superiour, should better support a weighty Body than the heavier, that is, the inferiour. Some imagine, that this comes to pass by reason of the Wind, which is constantly moving in the upper Air, which supports any Body that moves contrary to it. So we see that those Paper-kites which Boys make, are raised in the Air, by running with them contrary to the Wind: And when they are advanced to a great Height, do but stick down the nether End of the Line, to which they are fastned, into the Ground, they will be continued by the Wind at the same Height they were, so long as it lasts and abides in the same Quarter. In like manner, the Birds flying contrary to the Wind, it supports and keeps them up. But if this were the only Reason, methinks it should not be so easie, but rather very laborious for Birds to fly against the Wind, so as to make any considerable Progress in the superiour Air, as we see they do. And, therefore, possibly they may be nearer the Right, who suppose, that the Gravity of Bodies decreases proportionably to their Distance from the Earth; and that a Body may be advanced so high, as quite to lose its Gravity and Inclination, or Tendency to the Center: Of which I do not

see how it is possible to make Experiment. For, to what is said by some, to have been tried, that a Bullet shot perpendicularly upward out of a great Gun, never descended again, I give no credit at all.

BUT to leave that, it is certain, that the Vapours, after they are mounted up to a considerable Height in the Air, are congealed and turned into the immediate component Principles of Snow, in which Form I conceive they acquire a Lightness, and are apt to ascend higher than they could do, should they retain the Form of a humid Vapour; as, we see, Ice is lighter than Water, out of which it is frozen. But whether this be the reason of their Ascent, or not, I am sure of the Matter of Fact, that these Snow-Clouds do ascend far above the highest Tops of the *Alps*; For, passing over a Mountain in the *Grisons* Country, on the very Ridge of them, in the beginning of the Spring, it snowed very fast during my whole Passage for six hours; and yet the Clouds seemed to be as far above my Head, as they do here in *England*; and a great Height they must be, for the Snow to gather into so great Flakes, and to continue so long falling; nay, it may be three times so long. Moreover, we see, that the highest Pikes and Summits of those Mountains are covered with Snow. And I am assured, that all the Winter long, at intervals, it snows upon the Tops of the *Alps*.

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2. IN the Spring-time, when the Snow dissolves, some of these Rivers that flow down from the *Alpine* Mountains, run with a full Stream, and overflow their Banks, in clear Sun-shine Weather, though no Rain falls, as I myself can witness; and, therefore, I presume, that all the rest do so too, as the Inhabitants affirmed. But, in the Summer-time, after the Snow hath been some time melted, their Streams decay again, notwithstanding any Vapours condensed upon them, proportionable to the Droughts; neither are there any Floods, but upon Falls of Rain.

3. THAT the Snow dissolved, and soaking into the Earth, is the Original of the *Alpine* Springs; a probable Argument may be taken from the Colour of the Water of those Rivers which descend from the *Alps*, at least on this Northern-side, which I observed to be of a Sea-green, even to a great distance from their Heads; which, whence can it proceed, unless from the nitrous Particles of the Snow-water, of which they consist? Another also from the *Bronchocele*, or * *gutturine Tumour*, * Swoln Throats. an *Endemial* Disease of the Natives of those Parts, which Physicians and Naturalists attribute to the Water they drink, not without good Reason; because, say they, it consists of melted Snow, which gives it that malignant Quality. † *Scaliger* speaking of this † *De Subtilit. Exerc. 60. Sect. 2.* Disease, saith, *Id ab aqua fit è nivibus liquefactis, quæ multum terrestriis & crudi continent.* But

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But because *Julius Palmarius* may possibly be in the right, who imputes this Disease to the Steams of the Minerals, especially Mercurial, wherewith these Mountains abound, which infect the Waters, and render them noxious to the nervous Parts; I shall not insist upon this Particular.

IN confirmation of what I have said concerning the Original of the *Alpine* Springs, I shall add the Opinion of the Learned *Alphonsus Borellus*, concerning the Fountains springing up, or issuing out of the Sides of Mount *Ætna* in *Sicily*. They are probably (saith he) either generated, or at least encreased, from the melting of the Snow, which doth perpetually occupy the Top of the Mountain. And this is manifest, in that they are not diminished, nor decrease in Summer, as elsewhere it happens, but often flow more plentifully. Lib. De incendiis *Ætnæ*.

WHAT Mr. *Halley* saith of Springs, That they are perpetual, and without Diminution, even when no Rain falls, for a long Space of Time. If he understands it generally of all Springs, I add, that are accounted quick ones too, I deny his Assertion: That some there may be of that Nature, I grant. A Reason whereof may be given, viz. that the Outlet is too small to empty the Water of all the Veins and Earth that lie above it in a long time. In our Native Country of *England*, there are living and lasting Springs rising

sing at the Feet of our small Hills and Hills, to which, I am sure, the Vapours contribute very little; which is so obvious to every Man, that, I think, I need not spend time to prove it.

YET must I not dissemble or deny, that in the Summer-time the Vapours do ascend, or are carried up in that Form, by the Sides of the Mountains to their highest Tops, and above them; for there falls no Snow there, in the Heat of Summer; and that which lies there, is, for the most part, dissolved. But that Rain falls plentifully there, I myself can witness; having been on the two highest Tops of the Mount *Jura*, (which keeps the Snow all Winter) on the one called *Thuir* in a Thunder-shower; and on the other, called *la Dolaz*, in a smart and continuing Rain: So that I will not deny, but in Summer-time the Vapours may contribute somewhat to the Springs; as I have elsewhere intimated: Clouds almost continually hanging upon the Tops of the Mountains, and the Sun having there but little Power.

AND now that I am discoursing of these things, give me leave to set down an Observation I made in the last great Frost, the sharpest that was ever known in the Memory of Man, which I had before met with in Books, but did not give firm credit to, that is, that notwithstanding the Violence of the Frost, all the Springs about us brake out, and
ran

ran more plentifully than usually they did at any other time : Which I knew not what to impute to, unless perchance the close-Stop-
ping the Pores of the Earth, and keeping in that Part, which, at other times, was wont to vapour away ; which Account I neither then could, nor can yet fully acquiesce in.

To this I will here add an Abstract of a Letter, written by my honoured Friend Dr. *Tancred Robinson*.

‘ YOU may, peradventure, meet with some
‘ Opposition against your *Hypothesis* of
‘ Fountains, though, indeed, I am more and
‘ more confirm’d in your Opinion of them, and
‘ the Use of the Mountains. Father *Tachart*,
‘ in his second Voyage to *Siam*, says, When
‘ he went up to the Top of the *Table Moun-*
‘ *tain* at the *Cape of Good Hope*, the Rocks and
‘ Shrubs were perpetually dropping, and feed-
‘ ing the Springs and Rills below, there be-
‘ ing generally Clouds hanging on the Sides,
‘ near the Top. This constant Distillation of
‘ Vapours from the Ocean, on many high
‘ Ridges of that great Promontory, may, per-
‘ adventure, be one Cause of the wonderful
‘ Fertility and Luxury of the Soil, which pro-
‘ duces more rare Plants and Animals than any
‘ known Spot of Ground in the World ; the
‘ Discovery whereof is owing to the Curiosity
‘ and Wisdom of the *Dutch*. The same Ob-
‘ servation hath been frequently made by our
‘ *English*

English Merchants in the *Madera* and *Canary* Islands, (the first of which is near in the same Latitude on the North of the *Æquator*, that the aforementioned *Cape* is in the South) especially, in their Journeys up to the *Pike* of *Teneriff*, in which, at such and such Heights, they were always wet to the Skin, by the Droppings of the great Stones, yet no Rain over-head; the same I have felt in passing over some of the *Alps*. The Trees, which in the Islands of *Ferro*, *St. Thomas*, and in *Guinea*, are said to furnish the Inhabitants with most of their Water, stand on the Sides of vast Mountains: *Vossius*, in his Notes on *Pomponius Mela*, affirms them to be *Arborescent Ferula's*; though indeed, according to *Paludanus* his dry'd Sample sent to the Duke of *Wirtemberg*, they seem rather to be of the Laurel Kind; perhaps there are many different Sorts of them. I believe there is something in the many Relations of Travellers and Voyagers concerning these Trees; but then I fancy they are all mistaken, when they say, the Water issues out of the Trees: The Vapours stop'd by the Mountains, condense and distill down by the Boughs. There being no Mountains in *Egypt*, may be one Reason why there is little or no Rain in that Country, and consequently no fresh Springs; therefore in their *Caravans* they carry all their Water with them in great *Borracio's*, and they owe the Inundation of their River *Nile* to the stationary

Consequences of

' Stationary or periodical Rains on the high
 ' Parts of *Æthiopia*. This may be the Cause
 ' that the vast Ridge and Chain of Mountains
 ' in *Peru* are continually water'd, when the
 ' great Plains in that Country are all dry'd up
 ' and parch'd. This *Hypothesis* concerning the
 ' Original of Springs from Vapours, may hold
 ' better in those hot Regions, within and near
 ' the Tropicks (where the Exhalations from the
 ' Sea are most plentiful, most rarify'd, and Rain
 ' scarce) than in the temperate and frigid ones
 ' (where it rains and snows generally on the
 ' *Vertices* of the Mountains) yet even in our
 ' *European* Climates I have often observ'd the
 ' Firs, Pines, and other Vegetables near the
 ' Summits of the *Alps* and *Appennines*, to drop
 ' and run with Water, when it did not rain a-
 ' bove; some Trees more than others, accor-
 ' ding to the Density and Smoothness of their
 ' Leaves and Superficies, whereby they stop
 ' and condense Vapours more or less. The
 ' Beams of the Sun having little Force on the
 ' high Parts of Mountains, the interrupted Va-
 ' pours must continually moisten them, and (as
 ' in the Head of an Alembick) condense and
 ' trickle down; so that we owe part of our
 ' Rain, Springs, Rivers, and Conveniencies of
 ' Life, to the Operation of Distillation and Cir-
 ' culation by the Sun, the Sea, and the Hills,
 ' without even the last of which, the Earth
 ' would scarce be habitable. This present Year,
 ' in *Kent*, they have had no Rain since *March*
 ' last,

‘last, therefore most of their Springs are dry
‘at this very Day, as I am assured from good
‘Hands. The high Spouting of Water, even
‘to three Fathoms perpendicular out of innu-
‘merable Holes, on the Lake *Zirknitz* in *Car-*
‘*niola*, after Rains on the adjacent Hills, ex-
‘ceeds the Spiriting Gips, or Natural Jet
‘*d’Eaus* we have in *England*.

Nov. 12. 1691.

Tancred Robinson:

SINCE the Receipt of this Letter, an Experiment (give me leave so to call it) occurred to me, which much confirmed me in the Belief and Persuasion of the Truth of those Histories and Relations which Writers and Travellers have delivered to us concerning dropping Trees in *Ferro*, *S. Thome*, *Guinea*, &c. of which before I was somewhat diffident; and likewise in the Approbation of the Hypothesis of my Learned Friend Dr. *Tancred Robinson*, for the solving of that Phenomenon. The same also induces me to believe, that Vapours may have a greater Interest in the Production of Springs, even in temperate and cold Regions, than I had before thought. The Experiment or Observation is this:

ABOUT the Beginning of *December*, 1691, there happened to be a Mist, and that no very thick one, which continued all Day; the Vapour whereof, notwithstanding the Trees were wholly destitute of Leaves, condensed so fast upon their naked Branches and
Twigs,

Twigs, that they dropped all Day at such a rate, that I believe the Water distilling from a large Tree in twenty four Hours, had it been all received and reserved in a Vessel, might have amounted to a Hogshead. What then may we rationally conjecture, would have dropped from such a Tree; had it been covered with Leaves of a dense Texture, and smooth *Superficies*, apt to collect the Particles of the Vapour, and unite them into Drops?

It is clear by this Effect, that Trees do distill Water apace, when Clouds or Mists hang about them; which they are reported by *Benzo* constantly to do about the Fountain-Tree in *Ferro*, except when the Sun shines hot upon it. And others tell us, that that Tree grows upon a Mountain too: So that it is no wonder, that it should drop abundance of Water. What do I speak of that Tree? all the Trees of that Kind grow on the Sides of vast Mountains, as Dr. *Robinson* hath noted, yet he thinks that now and then many Trees may run and distill in Plains and Valleys, when the Weather has been fair, but then this *Phænomenon* happens very rarely, whereas in the other 'tis regular and constant. Besides, that in hot Regions Trees may in the Night-time distill Water, though the Air be clear, and there be no Mist about them, seems necessarily to follow, from Mr. *Halley's* Experiment.

Now,

Now, if there be in Mists thus much Vapour condensed upon Trees, doubtless also there is in Proportion as much upon the Surface of the Earth and the Grass; and consequently, upon the Tops and Ridges of high Mountains, which are frequently covered with Clouds, or Mists, much more; so much as must needs have a great Interest in the Production and Supply of Springs, even in temperate Countries.

BUT that invisible Vapours, when the Sky is clear, do at any time condense so fast upon the Trees, as to make them drop, I never observed in *England*, or elsewhere, no not in the Night Season, though I do not deny, but upon the *Appennine* and Southern Side of the *Alps*, and elsewhere in the hotter Parts of *Europe*, in Summer Nights, they may. However, considering the Penetrancy of such Vapours, that in moist Weather they will insinuate themselves deeply into the Pores of dry Wood, so that Doors will then hardly shut, and Chinks and Crannies in Boards and Floors be closed up, I know not but that they may likewise strike deep into the Ground, and together with Mists contribute to the Feeding and Maintenance of Springs, in Winter-time, when the Sun exhales but little; it being an Observation of the learned * *Fromondus*, *Quòd hyeme nec ni-vali, nec imbrifera, fontes tamen aquam largius quàm* *state (*nisi valdè pluvia sit*) vomant: That

* Meteor:
lib. 5. c. 7.
Artic. 3.

in Winters neither snowy nor rainy, yet Fountains pour forth more Water than in Summer, unless it happen to be a very wet Season. Yet are their Contributions inconsiderable, if compared with the Supplies that are afforded by Rains. And one Reason why in Winter Fountains flow more plentifully, may be, because then the Sun defrauds them not, nor exhales any thing out of the Earth, as in Summer-time he doth.

THEREFORE, whenever in this Work I have assigned Rain to be a sufficient or only Cause of Springs and Rivers, I would not be understood to exclude, but to comprehend therein Mists and Vapours, which I grant to have some Interest in the Production of them, even in temperate and cold Regions, and a very considerable one in hot. Though I cannot be persuaded, that even there they are the principal Cause of Springs, for that there fall such plentiful and long continuing Rains, both in the *East* and *West-Indies*, in the Summer Months: That Rains are the only Cause of the Fertility of the Earth, I am convinced by what was lately suggested to me by my honoured Friend Dr. *Tancred Robinson*, that all Dearth proceeds from Droughts as well in hot Countries as in temperate and cold, be the Vapours what they will. The Scripture confirms this, by joining Rain and fruitful Seasons together.

BUT

BUT to return from whence we digressed, that is, to the Consideration of that *Hypothesis*, or Opinion, That all the Rivers of the Earth discharge into the Sea half an Ocean of Waters daily.

THE Fruitfulness of the Earth is also in a great Measure owing to Floods, which proceed from Rain falling upon the Mountains, and washing down thence a great deal of Earth, and spreading it upon the lower Grounds and Meadows, which renders these so fruitful, that they bear plentiful Crops of Grass yearly, without any Culture or Manuring. An eminent Instance of this is the Land of *Egypt*, which owes its great Luxuriancy to the annual Overflowings of the River of *Nile*.

I HAVE read of some Philosophers, who imagined the Earth to be a great Animal, and that the Ebbing and Flowing of the Sea was the Respiration of it. And now, methinks, if this Doctrine be true, we have a farther Argument to confirm their Opinion: For this perpetual Motion of the Water answers very well to the Circulation of the Blood, the Water moving faster, in Proportion to its Bulk, through the Veins of this round Animal, than the Blood doth through those of other living Creatures. To which we may add farther, that to maintain this constant Circulation, there is also, probably, about the Center of the Earth a perpetual Fire, an-

swering to the *Biolychnium* in the Heart; but if not about the Center, yet certainly in profound Caverns, and even under the very Bottoms of the Seas; to which some, and no mean Philosophers, have attributed the Ebbing and Flowing of its Waters.

BUT because (as I said before) this Opinion seems to me intolerably extravagant, I shall let it pass without any serious Consideration; and also omit the Inferences I made from it in the former Edition of this Work.

FOR (as I have noted before) this forty Days Rain, at the Time of the Deluge, was no ordinary one, such as those that usually distill down leisurely and gently in Winter-time, but like our Thunder-Storms and violent Showers, Catarracts, and Spouts, which pour forth more Water in an Hour than they do in four and twenty: So that in forty Natural Days the Clouds might well empty out more than eight Oceans of Water upon the Earth. And so we need not be to seek for Water for a Flood; for the Rain falling at that rate we have mentioned, would, with the Addition of as much Water from the subterraneous Abyss, or great Deep, in the Space of forty natural Days, afford Water enough to cover the Earth, so far as to set the Ark afloat, or raise it up so high, as that its Bottom should not touch the Ground.

I HAVE but one thing more to add upon this Subject; that is, that I do not see how
their

their Opinion can be true, who hold that some Seas are lower than others; as for Example, the *Red-Sea* than the *Mediterranean*. For it being true that the Water keeps its Level, that is, holds its Superficies every where equidistant from the Center of Gravity; or if by Accident one Part be lower, the rest, by reason of their Fluidity, will speedily reduce the Superficies again to an Equality; the Waters of all Seas communicating either above, or under Ground, or both ways, one Sea cannot be higher or lower than another: But supposing any Accident should elevate or depress any, by reason of this Confluence or Communication it would soon be reduced to a Level again, as might demonstratively be proved.

BUT I return, to tell the Reader what I think the most probable of all the Causes I have heard assigned of the Deluge, which is, the Center of the Earth being at that time changed, and set nearer to the Center or Middle of our Continent, whereupon the *Atlantick* and *Pacifick* Oceans must needs press upon the subterraneous Abyss, and so by Mediation thereof, force the Water upward, and at last compell it to run out at those wide Mouths and Apertures made by the Divine Power breaking up the Fountains of the great Deep. And we may suppose this to have been only a gentle and gradual Emotion, no faster than that the

Waters running out at the Bottom of the Sea, might accordingly lower the Superficies thereof sufficiently, so that none needed run over the Shores. These Waters thus poured out from the Orifices of the Fountains upon the Earth, the Declivity being changed by the Removal of the Center, could not flow down to the Sea again, but must needs stagnate upon the Earth, and overflow it; and afterwards the Earth returning to its old Center, return also to their former Receptacles.

THIS *Hypothesis* gives us a fair and easy Solution of all the *Phænomena* of the Deluge, save only the Generality of it, (making it topical, and confining it to our Continent) and delivers us from that great and insuperable Difficulty of finding eight, nay, twenty two Oceans of Water to effect it: For no less is requisite to cover the whole Terraqueous Globe with Water, to the Height of fifteen Cubits above the Tops of the highest Mountains. But because the Scripture useth general Expressions concerning the Extent of the Flood, saying, *Gen. i. 19. And all the high Hills that were under the whole Heaven were covered*; and again, *ver. 22. All in whose Nostrils was the Breath of Life, of all that was in the dry Land, died*. And, because the *Americans* also are said to have some ancient Memorial Tradition of a Deluge, (as credible Authors, *Acosta, Herrera*, and others inform us) which
faith,

saith, *That the whole Race of Mankind was destroyed by the Deluge, except some few that escaped:* (They are the Words of *Augustine Corata*, concerning the *Peruvian* Tradition; and *Lupus Gomara* saith the same, from those of *Mexico*) And the ingenious Author of the *Theory of the Earth*, hath, by a moderate Computation, demonstrated, That there must be then more People upon the Earth than now: I will propose another way of solving this *Phenomenon*, and that is, by supposing that the Divine Power might at that time, by the Instrumentality of some natural Agent, to us at present unknown, so depress the Surface of the Ocean, as to force the Waters of the Abyss through the fore-mentioned Channels and Apertures, and so make them a partial and concurrent Cause of the Deluge.

THAT there are, at some times, in the Course of Nature, extraordinary Pressures upon the Surface of the Sea, which force the Water outwards upon the Shores to a great Height, is evident. We had upon our Coasts, few Years ago, an extraordinary Tide, wherein the Water rose so high, as to overflow all the Sea-Banks, drown Multitudes of Cattle, and fill the lower Rooms of the Houses of many Villages that stood near the Sea, so that the Inhabitants, to save themselves, were forced to get up into the upper Rooms and Garrets of their Houses. Now, how this

I 4

could

could be effected, but by an unusual Pressure upon the Superficies of the Ocean, I cannot well conceive. In like manner, That the Divine Providence might, at the time of the Deluge, so order and dispose second Causes, as to make so strong a Pressure upon the Face of the Waters, as to force them up to a Height sufficient to overflow the Earth, is no way unreasonable to believe. But because there must be another Miracle required, to suspend the Waters upon the Land, and to hinder them from running off again into the Sea; this is far more unlikely than the former Account.

THESE *Hypotheses* I propose, as seeming to me, at present, most facile and consonant to Scripture, without any Concern for either of them; and, therefore, am not solicitous to gather together, and heap up Arguments to confirm them, or to answer Objections that may be made against them, being as ready to relinquish them upon better Information, as I was to admit and entertain them.



C H A P. III.

Of the Effects of the Deluge.



COME now to the Third Particular proposed; that is, To Enquire concerning the Consequents of the Deluge; What considerable Effects it had upon the Earth, and its Inhabitants.

It had, doubtless, very great, in changing the *Superficies* of the dry Land. In some Places, adding to the Sea; in some, taking from it; making Islands of *Peninsula*, and joining others to the Continent; altering the Beds of Rivers, throwing up lesser Hills, and washing away others, &c. The most remarkable Effects, it's likely, were in the Skirts of the Continents; because the Motion of the Water was there most violent. * *Athanasius Kircher* gives us a Map and Description of the World after the Flood, shewing what Changes were made therein by it, or upon occasion of it afterward, as he fancies or conjectures. But because I do not love to trouble the Reader with uncertain Conjectures, I shall content myself to have said in general, that it may rationally be supposed, there were then great Mutations and Alterations made in the superficial Part of the Earth :

* *De Architectura Noa.*
p. 192.

Earth; but what they were, though we may guess, yet can we have no certain Knowledge of: And for Particulars, refer the Curious to him.

ONE malignant Effect it had upon Mankind, and probably upon other Animals too, in shortning their Age, or the Duration of their Lives; which I have touched before, and shewn, that this Diminution of Age is to be attributed either to the Change of the Temperature of the Air, as to Salubrity, or Equality, (sudden and frequent Changes of Weather having a very bad Influence upon the Age of Man in abbreviating of it, as I could easily prove) or else to the Deteriority of the Diet; or to both these Causes. But how the Flood should induce or occasion such a Change in the Air, and Productions of the Earth, I do not comprehend.



C H A P. IV.

*Of formed Stones, Sea-shells, and other
Marine-like Bodies found at great Di-
stances from the Shores, supposed to have
been brought in by the Deluge.*



NO OTHER supposed Effect of the Flood, was a bringing up out of the Sea, and scattering all the Earth over, an innumerable Multitude of Shells and Shell-fish; there being of these Shell-like Bodies, not only on lower Grounds and Hillocks, but upon the highest Mountains, the *Appennine* and *Alps* themselves. A supposed Effect, I say, because it is not yet agreed among the Learned, whether these Bodies, formerly called *petrified Shells*, but now-a-days passing by the Name of *formed Stones*, be original Productions of Nature, formed in Imitation of the Shells of Fishes; or the real Shells themselves, either remaining still entire and uncorrupt, or petrified and turned into Stone, or, at least, Stones cast in some Animal Mold. Both Parts have strong Arguments and Patrons. I shall not balance Authorities, but only consider and weigh Arguments.

THOSE for the latter Part, wherewith I shall begin, are,

First,

Consequences of

First, Because it seems contrary to that great Wisdom of Nature, which is observable, in all its Works and Productions, to design every thing to a determinate End, and, for the attaining that End, make use of such Ways, as are most agreeable to Man's Reason, that these prettily shaped Bodies should have all those curious Figures and Contrivances (which many of them are formed and adorned with) generated or wrought by a *Plastick Vertue*, for no higher End, than only to exhibite such a Form. This is Dr. Hook's Argumentation. To which Dr. Plot answers, *That the End of such Productions is, to beautify the World with those Varieties; and that this is no more repugnant to the Prudence of Nature, than is the Production of most Flowers, Tulips, Anemones, &c. of which we know as little use of, as of formed Stones.* But hereto we may reply, That Flowers are for the Ornament of a Body, that hath some Degree of Life in it: A Vegetative Soul, whereby it performs the Actions of Nutrition, Auſtion and Generation; which it is reasonable should be so beautified. And, *Secondly*, Flowers serve to embrace and cherish the Fruit, while it is yet tender; and to defend it from the Injuries of Sun and Weather; especially, for the Protection and Security of the *Apices*, which are no idle or useless Part, but contain the Masculine Sperm, and serve to give Fecundity to the Seed.

Seed. *Thirdly*, Though formed Stones may be useful to Man in Medicine, yet Flowers afford us abundantly more Uses, both in Meat and Medicine.

YET I must not dissemble, that there is a *Phænomenon* in Nature, which doth somewhat puzzle me to reconcile with the Prudence observable in all its Works, and seems strongly to prove, that Nature doth sometimes *ludere*, and delineate Figures, for no other End, but for the Ornament of some Stones, and to entertain and gratify our Curiosity, or exercise our Wits: That is, those elegant Impressions of the Leaves of Plants upon *Cole-slate*, the Knowledge whereof, I must confess myself to owe to my learned and ingenious Friend, Mr. *Edward Lhwyd* of Oxford, who observed of it in some Colepits in the Way from *Wycheſter* in *Gloceſterſhire*, to *Bristol*; and afterwards communicated to me a Sample of it. That which he found, was marked with the Leaves of two or three Kinds of *Ferns* and of *Harts-tongue*. He told me also, that Mr. *Woodward*, a *Londoner*, shewed him very good Draughts of the common *Female Fern*, naturally formed in Cole, which himself found in *Mendip Hills*; and added, That he had found in the same Pits, Draughts of the common *Cinquefoil*, *Clover-grass* and *Strawberries*. But these Figures are more diligently to be observed and considered.

DR.

Dr. Woodward will have these to be the Impressions of the Leaves of Plants, which were there lodged at the Time of the general Deluge.

Secondly, There are found in the Earth at great Distance from the Sea, real Shells unpetrified and uncorrupted, of the exact Figure and Consistency of the present natural Sea-shells, and in all their Parts like them, and that not only in the lower Grounds and Hillocks near the Sea, but in Mountains of a considerable Height, and distant from the Sea. *Christianus Mentzelius*, in his Discourse concerning the *Bononian Phosphorus*, gives us a Relation of many Beds of them found mingled with Sand in the upper Part of a high Mountain not far from *Bologna* in *Italy*. His Words are these, *Non procul monte Paterno dicto, lapidis Bononiensis patria, unico forte milliari Italico distante (loci nomen excidit memoria) ingens mons imminet præruptus à violentia torrentium aquarum, quas imbrès frequentes ex vicinis montibus confluentes efficiunt, atque insignes terrarum moles ab isto monte prosternunt ac dejiciunt. In hac montis ruina, superiore in parte visuntur multæ strages seriæve, ex testis conchyliorum omnis generis, plurimâ arenâ interjectâ, instar strati superstratum (ut chymicorum vulgus loquitur.) Et enim inter hæc testarum conchyliorum strages seriæve arena ad crassitiem ulnæ & ultra interposita. Erant autem testæ variorum conchyliorum,*

litorum, omnes ab invicem distinctæ, nec cuiquam lapidi impactæ, adeò ut separatim omnia manibus tractari & dignosci potuerint. Effecerat hoc arena pura, nullo limo lutove intermixta, quæ conchyliorum testas conservaverat per multa secula integras. Interea verò diuturnitate temporis omnes istæ testæ erant in albißimam calcem faciliè resolubiles. Not far from the Mountain called Paterno, where the Bononian Stone is gotten, about an Italian Mile distant, (the Name of the Place is slipt out of my Memory) is a huge hanging Mountain, broken by the Violence of the Torrents, caused by the Confluence of Waters descending from the neighbouring Mountains after frequent Showers, throwing down great Heaps of Earth from it. In this upper Part of this broken Mountain, are seen many Beds or Floors of all kind of Sea-shells, much Sand interposing between Bed and Bed, after the manner of stratum super stratum, or Layer upon Layer, as the Chymists phrase it. The Beds of Sand interceding between these Rows of Shells, were a Yard thick, or more. These Shells were all distinct or separate one from another, and not stuck in any Stone, or cemented together, so that they might be singly and separately viewed and handled with one's Hands. The Cause whereof was their being lodged in a pure Sand, not intermixt with any Mud or Clay, which kept the Shells entire for many Ages. Yet were all these Shells, by reason of the
Length

Length of Time they had lain there, easily resolvable into a purely white Calx or Ash. Fabius Columna also observes, That in the tophaceous Hills and Cliffs about *Andria* in *Apulia*, there are found various sorts of Sea-shells, both broken and whole, uncorrupt, and that have undergone no Change. And *Ovid in Metam. lib. 15.*

Et procul à pelago Conchæ jacuere marinæ.

I am also informed, by my learned and worthy Friend, Dr. *Tancred Robinson*, That *Signor Settali* shewed him, in his *Museum* at *Milan*, many *Turbens*, *Echini*, *Pearl-shells*, (one with a Pearl in it) *Pectunculi*, and several other perfect Shells, which he himself found in the Mountains near *Genoa*; and afterwards, my said Friend took notice also of several Beds of them himself, as he passed over Mount *Cenis*, above fifty Leagues distant from the Sea; he assures me, That many of the great Stones about the Buildings of *London*, are full of Shells, and Pieces of them. Moreover, my forementioned Friend, Mr. *Lhwyd*, sent me perfect *Escallop* and *Sea-Urchin* Shells, exactly resembling the like Sea-shells, both for Figure, Colour, Weight, and Consistency; which he himself gathered up near *Oxford*: And hath lately sent me word, That he found at a Place called *Rungewell-Hill* in *Surrey*, at a Village called *Hedley*, three Miles South of *Epsom*,
at

at least twenty Miles distant from the Sea, some Fossil Oysters, which, by the Confession of Dr. *Lister* himself, were indeed true Oyster-shells, not petrified, nor much decayed: Nay, so like they were to Oysters newly taken out of the Sea, that a certain Person seeing them, mistook them for such, and opened one of them, expecting to find a living Fish therein.

ANOTHER the like Bed of Oyster-shells found in his own Ground, my worthy and ingenious Friend Mr. *Peter Burrell*, Merchant in *London*, gave me an Account of: Which take in his own Words.

‘ I HAVE a Pit, wherein is a Bed or Vein
 ‘ of Oyster-shells: About two Foot under
 ‘ the Surface of the Earth they begin; and
 ‘ are from about a Yard to one Half-yard
 ‘ deep; and then succeeds a harsh Sand, that
 ‘ goes down two or three Yards deep, or
 ‘ more. In a Rivulet that runs through my
 ‘ Garden, half a Furlong from the foresaid
 ‘ Pit, there are of the same Shells great and
 ‘ small, not lying singly, but in great Clu-
 ‘ sters of great and small together, with the
 ‘ upper and lower Valves entire. When you
 ‘ open them, those that have not been ex-
 ‘ posed to the Air, or impair’d by the Wa-
 ‘ ter, have a Concavity within, and a hard
 ‘ Mossiness sticking to the Inside of each
 ‘ Shell. Those of the Pit are amassed as
 ‘ hard as a Rock; and where there are
 K not

‘ not little Veins of Sand mixt with them,
 ‘ they break into Pieces as big as a Half-
 ‘ Peck: But, when expos’d to the Weather,
 ‘ crumble like Murle, and are good to ma-
 ‘ nure Land, especially, those which have
 ‘ least Sand mixed with them. It’s excel-
 ‘ lent to bind Walls; only, upon Thaws
 ‘ in the Winter-time, it relaxes a little.

‘ I FIND, by digging in several Places,
 ‘ that there is a Layer or Bed of these Shells,
 ‘ which runs from North-West to South-
 ‘ East, two or three Furlongs in mine and
 ‘ my Neighbour’s Grounds. We are 60
 ‘ Miles distant from the Sea, though but 5
 ‘ Miles from the River of *Thames*, on the
 ‘ Edge of *Surrey*, and lie high on the same
 ‘ Level with *Croyden*.” So far Mr. *Burrell*.

THE Place where this Gentleman lives, is
 at *Beckenham*, near *Bromley* in *Kent*, ten
 Miles distant from *London*. He sent me
 Samples of the Oyster-shells, exactly agree-
 ing with the Account he gives of them.
 They seem to have been the Shells of real
 and living Oysters, and to have suffered no
 greater Change than they must needs do
 from the Nature of the Earth and Sand they
 were lodged in, and from the Water com-
 mixt therewith. And the Lying of them in
 such a Bed, is a strong Argument to prove,
 that this Place was some time the Bottom of
 the Sea, which is a thing hard to be be-
 lieved.

ANOTHER

ANOTHER Instance of such a Bed of Fossil Oyster-shells, I find in the *Philosophical Transactions*, N. 261. p. 485. communicated by Mr. *James Brewer*.

THESE Oyster-shells were found and digged up near *Reading*, in *Berkshire*. The Circumference of the Place where they have been digged up, contains (as is judged) between five and six Acres of Land. The Foundation of these Shells is a hard, rocky Chalk. The Shells lie in a Bed of green Sand, upon a Level through the whole Circumference, as high as can possibly be judged. This *Stratum* of green Sand and Oyster-shells, is (as I measured it) high a Foot deep. Now, immediately above this Layer or *Stratum* of green Sand and Shells, is a Bed of bluish sort of Clay, very hard, brittle and rugged; They call it a pinny Clay, and is of no Use: This Bed or Layer of Clay, I found to be high a Yard deep; and immediately above it, is a *Stratum* of Fullers-Earth, which is high two Foot and a half deep. This Earth is often made use of by our Clothiers. And above this Earth, is a Bed or Layer of a clear, fine, white Sand, without the least Mixture of any Earth, Clay, &c. which is high seven Foot deep. Then, immediately above this, is a stiff red Clay, (which is the uppermost *Stratum*) of which we make our Tiles. The Depth

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of

' of this cannot conveniently be taken, it be-
 ' ing so high a Hill ; upon the Top of which,
 ' is, and hath been dug, a little common
 ' Earth, about two Foot deep ; and imme-
 ' diately under, appears this red Clay that
 ' they make Tiles withal. I dug (*said he*)
 ' several whole Oysters, with both their
 ' Valves or Shells lying together, as Oysters
 ' before opened ; in their Cavity was got in
 ' some of the forementioned green Sand.
 ' These Shells are so very brittle, that in
 ' digging them up, one of the Valves will
 ' frequently drop from its Fellow ; but 'tis
 ' plainly to be seen, that they were united
 ' together, by placing the Shell that drops
 ' off to his Fellow Valve, which exactly cor-
 ' responds ; but I dug up several that were
 ' entire, nay, some double Oysters, with all
 ' their Valves united." So far Mr. *Brewer*.

FOR, that Nature should form real Shells,
 without any Design of covering an Animal,
 is indeed so contrary to that innate *Prolepsis*
 we have of the Prudence of Nature, (that is,
 the Author of Nature) that without doing
 some Violence to our Faculties, we can hard-
 ly prevail with ourselves to believe it ; and
 gives great Countenance to the Atheists As-
 sertion, That Things were made or did exist
 by Chance, without Counsel or Direction to
 any end.

ADD hereto, *Thirdly*, That there are other
 Bodies besides Shells found in the Earth, re-
 sembling

resembling the Teeth and Bones of some Fishes, which are so manifestly the very Things they are thought only to resemble, that it might be esteemed Obstinacy in any Man that hath viewed and considered them, to deny it. Such are the *Glossopetra* dug up in *Malta* in such abundance, that you may buy them by Measure, and not by Tale: And also the Vertebres of Thornbacks, and other cartilagineous Fishes there found, and sold for Stones among the *Glossopetra*, which have no greater Dissimilitude to the Teeth of a living *Shark*, and Vertebres of a *Thornback*, than lying so long in the Earth, as they must needs have done, will necessarily induce. Mr. *Doody* has in his Custody a petrify'd Lump of Fishes, on some of which the Scales themselves still remain. And if the very Inspection of these Bodies is not enough to convince any Man that they are no Stones, but real Teeth and Bones, *Fabius Columna* proves it by several strong Arguments.

1. Those Things which have a woody, bony, or fleshy Nature, by burning are changed first into a Coal, before they go into a *Calx* or Ashes: But those which are of a tophaceous or stony Substance, go not first into a Coal, but burn immediately into a *Calx* or Lime, unless by some Vitreous or Metallick Mixture they be melted. Now these Teeth being burnt, pass presently into a Coal, but the tophous Substance adhering to them, doth

not so ; whence it is clear, that they are of an ossaceous, and no stony Nature.

NEXT he shews, That they do not shoot into this Form after the Manner of Salts or Crystal, which I shall have Occasion farther to treat of by and by. Then he proves it from the Axiom, *Natura nihil facit frustra* ; Nature makes nothing in vain. But these Teeth, were they thus formed in the Earth, would be in vain ; for they could not have any Use of Teeth ; as neither the Bones of supporting any Animal. Nature never made Teeth without a Jaw, nor Shells without an Animal Inhabitant, nor single Bones, no not in their own proper Element, much less in a strange one. Farther he argues, from the Difficulty or Impossibility of the Generation of *Glossopetra* in such Places ; because, among *Tophi* and Stones in those dry Places, there could not be found Matter fit to make them of. But granting that, he queries whether they were generated at first all of a sudden, or grew by little and little from small to great, as Animals Teeth, whose Form they imitate, do. If the first be said, he demands, Whether the *Tophus*, out of which they were extracted, were generated before, or after the Teeth were perfected ? If it be said before, he asks, Whether there were a Place in it of the Figure and Magnitude of the Tooth, or did the Tooth make itself a Place ? If the *Tophus* were concrete before, and with-
out

out a Cavity, the vegetative Power of the Stone now in Birth, could not by Force make itself a Place in the hard and solid *Tophus*; or if it could, and did, the *Tophus* must needs be rent. Against the Production of these Bodies in a compact Earth or Stone, *Nic. Steno* argues thus: Things that grow, expanding themselves leisurely or slowly, may indeed lift up great Weights, and dilate the Chinks and Veins of Stones, as we see the Roots of Trees sometimes do; but yet while they do thus make room for themselves, they cannot but be often hindered by the Resistance of some hard Obstacle they meet with, as it happens to the Roots of Plants, which in hard Earth, being a thousand ways writhen and compressed, recede from the Figure, which otherwise in soft Land they are wont to retain; whereas these Bodies, whereof we are now discoursing, are all like one another, whether they be dug out of soft Earth, or cut out of Stones, or pluck'd off Animals. Wherefore they seem not to be at this Day produced in those Places where they are found, because (as we have said) those things which grow in compact Places are found strangely mishapen and irregular, which these are not: Nor was the Earth compacted when they were there produced for the same reason. *Columna* proceeds, If there were a Place before ready made in the *Tophus*, then was not that Fi-

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gure

gure excavated in the *Tophus* by the vegetative Nature of the Tooth itself; but the *Tophus*, by its own Nature and precedent Cavity, gave the Form to the Tooth. If the latter Part be chosen, and it be said, that the Stone by its vegetative Power grew by Degrees; it may be answered as before, that could not be, because the Hardness of the *Tophus* could not have yielded to the vegetative Force of the Tooth, but would rather have been rent or divided by it; or rather the *Tophus* itself must have vegetated, containing a Cavity or *Uterus* of the Shape of the Tooth, into which an ossious Humour, penetrating through the Pores, and filling the Cavity of the *Uterus*, must there have coagulated, and taken the Form thereof, as is observed in Stones that have their Original from a *Fluor*. That both Tooth and Case might vegetate together, he denies, because in all the Teeth which he had seen, the *Basis* or Root was found broken, and that not with an uniform Fracture, but different in every one. Which Argument is not to be slighted, for that it shews or proves, that there was no Vegetation in the case; because in all other figured Fossils it is observed, that they are never found mutilous, broken, or imperfect. Neither can it reasonably be said or believed, that these Roots or Teeth were by some chance broken within the *Tophi*, but rather, that when they were casually overwhelmed
and

and buried in that tophous Earth, they were broken off from the Jaws of the Animal in those Volutions, and so in that manner mutilated. Against the Generation of these and the like Bodies in any hard Earth or Stone, *N. Steno* argues thus, That they are not at present produced in hard Earth, one may thence conjecture, that in all the Parts of such Earth or Stone throughout, they are all found of the same Consistence, and encompassed round on all Sides with that hard Matter: For if there were some of them produced anew at this present Day, the containing or ambient Bodies ought to give way to them while they are growing, which they cannot; and the Bodies themselves that are now produced, would, without doubt, discover something wherein they differed from those that were generated of old. Another Argument to prove them to be true Teeth, and no Stones, he brings from their various Parts and Figures, which must else have been so wrought and formed in vain. The Tooth being not one homogeneous Body, but compounded of Parts of a different Constitution, there must in the Formation of it be made a various Election of Humours, one for the Root, one for the inner Part, one for the Superficies of it. Then for the Figures, Magnitude, Situation or Posture, and Fitting of them; some are great, and broad, and almost triangular; others narrower and smaller,

ler, others very small and narrow, of a pyramidal Figure ; some streight, some crooked, bending downwards, or toward the nether Side ; some inclining toward the Left, others toward the Right Side ; some serrate with small Teeth, others with great Indentures, (which is observed in the lesser triangular ones) some smooth without any Teeth, as the narrow pyramidal ones. All which Things are observed in Sharks Teeth, not only by the learned Naturalists, but also by Fishermen and Mariners. The first Row of Teeth in these Animals hanging out of the Mouth, bend forward and downward ; the second Row are streight, especially toward the Sides of the Mouth, where they are triangular and broad, the other Rows bend downward toward the inner Part of the Mouth. Thus far * *Columna*.

* *Dissert.*
De Glossopetra.

THIS Argument is also made use of by *Agostino Scilla* : ‘ The *Apophyses*, also, (*saithe*) or Processes, in the *Glossopetra*, demonstrate their Original, were there nothing else ; since they exactly answer to those in Sharks Teeth, whereby every Tooth is inserted into its Neighbour in the living Animal, with those Parts porous, and those spongious, that are so in the Tooth of the Fish. Nay, whereas Sharks Teeth are mortified into one another, in such a manner, that a Man may easily tell, which belongs to which Side, which lie near the Throat,

‘ Throat, which near the Snout, which lie
 ‘ to the Right, which to the Left. And
 ‘ whereas, in a Shark’s Jaw, the Teeth on the
 ‘ Left Side will not fit on the Right, nor those
 ‘ above serve below ; so that upon seeing a
 ‘ Tooth, one may know which Side and
 ‘ what Jaw it belongs to.” He hath obser-
 ved every one of these things, in his *Glossopetra*, which punctually answer in every Part
 to the several Ranks of the Teeth in a living
 Shark.

Fourthly, If these formed Stones be in-
 deed original Productions of Nature, in Imita-
 tion of Shells and Bones, how comes it to
 pass, that there should be none found that
 resemble any other natural Body, but the
 Shells and Bones of Fishes only? Why should
 not Nature as well imitate the Horns, Hoofs,
 Teeth, or Bones of Land Animals, or the
 Fruits, Nuts, and Seed of Plants? Now, my
 learned Friend, Mr. *Edward Lhwyd*, above
 mentioned, who hath been most diligent in
 collecting, and curious in observing these Bo-
 dies, of any Man I know, or ever heard of,
 tells me, That he never found himself, or
 had seen in any Cabinet, or Collection, any
 one Stone that he could compare to any part
 of a Land Animal. As for such that do not
 resemble any part of a Fish, they are either
 Rock Plants, as the *Astroites*, *Asteria tro-*
chites, &c. or do shoot into that Form, after
 the

the manner of Salts and *Fluors*, as the *Belemnites* and *Selenites*.

Fifthly, Those that deny these Bodies to have been the Shells and Bones of Fishes, have given us no satisfactory Account of the manner of their Production. For that they do not shoot into that Form after the manner of Salts, may be proved by many Arguments. *First*, All Salts that shoot, their Crystals or Concretions are of one uniform Substance; as Signor *Agostino Scilla* clearly demonstrates. ' Salt (*saieth he*) is Salt as well ' within as without; A Granate and a Topaz is a Granate and a Topaz throughout; ' Diamonds and Rubies are Diamonds and ' Rubies all over; they are Agregates of similar Particles which compose the whole ' Mass, be it greater, or be it less: Whereas, *Glossopetra*, for Example, like all other ' vegetating Substances, are made up of various and dissimilar Corpuscles, put together in such a manner, as is peculiarly subservient to the End for which they were ' made: Accordingly, the *Cortex* is of one ' Substance, the *Medulla* of another, and ' that lodged in proper Cells, the Root distinct from them both." In other Bodies that shoot, as the *Pyrites* and *Belemnites*, one may observe streight *Radii* or Fibres proceeding from one Center. *Secondly*, Did those Bodies shoot into these Figures, after the manner of Salts, it seems strange to me,

me, that two Shells should be so adapted together at the Heel, as to shoot out to the same Extension round, and the upper and nether Valve be of different Figure, as in natural Shells. *Thirdly*, Were these Bodies produced in the manner of saline Concretions; it's strange there should be such Varieties of them, and their Shapes so regular, and exactly circumscribed : So great a Diversity of Figures, arguing a greater Variety of Salts, or of their Modifications and Mixtures, than are likely to be found in Nature; and the Concretions of Salts never, that I have yet seen, appearing in that Regularity of Figure, and due Circumscription, as in these Bodies. This Argument, *Steno*, in his Discourse concerning these Bodies, improves and urges thus ; ' Who can deny, that the hexaedrical
' Figure of Crystal, the Cubes of Marcasites,
' and the Crystals of Salts in Chymical Operations, and infinite other Bodies coagulating and crystallizing in a Fluid, have
' Figures much more ordinate than are
' those of *Scallops*, *Cockles*, and other Bivalves,
' and also *Periwinkles* and *Turbens* ? Yet
' we see, in these simple Bodies, sometimes
' the Top of a solid Angle cut off ; sometimes many of them, without any Order,
' sticking one to another ; sometimes their
' Planes differing among themselves, in Magnitude and Situation ; and many other
' Ways receding from their usual Figure :
' Which

‘ Which being so, how much greater and
 ‘ more notable Defects must there needs
 ‘ have been in Bodies that have a far more
 ‘ compound Figure, such as are those which
 ‘ imitate the Forms of Animals, if they were
 ‘ in like manner generated? Seeing, there-
 ‘ fore, in these Bodies, which are very much
 ‘ compounded, these Defects do seldom oc-
 ‘ cur, which in those other most simple Bo-
 ‘ dies, are very frequent; seeing there are
 ‘ no Defects observed in these compound Bo-
 ‘ dies, the like whereto are not in like man-
 ‘ ner seen in the Bodies of Animals: And
 ‘ seeing that wheresoever they are found,
 ‘ they are exceeding like both among them-
 ‘ selves, and to the Parts of Animals, it is
 ‘ very unlikely they should shoot into those
 ‘ Figures after the manner of Salts; but on
 ‘ the contrary, highly probable that they
 ‘ were originally the Parts of Animals; the
 ‘ Similitude of Conformation in their Pores,
 ‘ *Striæ*, Hinges, Teeth, Prominences, Threds,
 ‘ &c. almost necessarily inferring a Simili-
 ‘ tude of Original; which is an Argument
 ‘ of the Government of some Principle, su-
 ‘ perior to Matter figured and moved, in
 ‘ their Formations.”

Fourthly, Were these Bodies nothing but
 Concretions of Salts, or saline Mixtures, it
 seems no less strange, that so many Liquors
 impregnated with all sorts of Salts and Mi-
 neral Juices, in all Proportions, having been
 at

at one time or other industriously or accidentally exposed to crystallize, and let stand long in Vessels, there should never have been found in them any such Concretions. For if any had happened, we should, doubtless, have heard of them, and the Observers would have improved such an Experiment to the Production of the like Bodies, at their Pleasure.

Two farther Arguments, to prove that these Bodies were not primary Productions of Nature, the forementioned Signor *Scilla* affords us. ‘ Nature (*says he*) sometimes produced monstrous and defective Things. ‘ An Animal sometimes wants a Limb; A ‘ Tree is without some principal Branches; ‘ A Fruit may want some of its chiefest ‘ Parts. Yet still we may observe, that Nature covers that Defect with a Skin, or ‘ Bark, or Rind, so that it never appears ‘ torn off, or rent, to the naked Eye, as it ‘ would, if it were torn off by a Hand, or ‘ cut off with a Knife. This is Nature’s constant Course; which evidently shews, that ‘ *lusus Naturæ* (as these are erroneously ‘ called) were never produced in the Earth; ‘ since all the Bruises and Fractures which ‘ they have met with, are apparent, without ‘ any Disguise to hide them; such as Nature always employs to hide the Defects of her own irregular Productions. ”

BUT

BUT this may be solved, by saying, that these Fractures and Bruises happened to them, after they were perfectly formed, and, as I may so say, out of Nature's Hands; and so, Nature not concerned to cover their Defects.

Secondly, All the *Echini*, or other Land-Shells, which he found upon the *Calabrian* or *Messineze* Hills, or had been brought him from *Malta*, were bruised by a perpendicular Pressure, which he explains thus: 'The
' Crust of all *Echini* has two Centers, one
' directly opposite to the other; so that if
' they happened to lie in the liquid Mud, in
' such a manner as that the lowest Center
' was perpendicular to the *Horizon*, they
' were bruised so as not to lose their circular Figure, only they were much compressed. If they lay on one Side, they were
' squeezed out of that Shape, and the Membranes of the Ligatures parted from each
' other variously, according to the Situation
' of these Shells in the Mud, at that Time.
' All which plainly shews, that as the Mud
' dried, the superincumbent Weight pressed
' perpendicularly upon the enclosed Bodies,
' which were then compressed together in
' that Posture they happened to be in; and
' were more or less compressed, according
' as the Mud got into their Cavities, in greater
' or lesser Quantities; and, as it dried, pressed them up on the Inside, against the
' Pref-

‘ Pressure of the Matter in which they lay.” So far *Scilla*. By all which it appears, That these Shells were not formed in the Mud where they lay, but precedently in the Sea; and were, by extraordinary Tides or Inundations of the Sea, thrown up together with the Mud; which else would not have had those Effects upon them.

As for what may be objected out of Sir *John Narborough’s* Voyage; ‘ That the Hills round about Port *S. Julian*, are full of ‘ Beds of great Oyster-shells, which could ‘ not come (*saieth he*) from the Sea or Flood, ‘ because there is no such Shell-Fish in ‘ those Seas or Shores.” I answer, That there might be such in the Seas thereabout, although it was not Sir *John’s* Hap to meet with them, or else they might be brought, by tempestuous Wind, from a great way off, as were those Shells brought into *Calabria*, which we have before mentioned out of *Ago-stino Scilla*.

So I have finished what I have to alledge, in Defence of the latter Part, That these formed Stones were sometimes the real Shells or Bones of Fishes, I mean the figured Part of them.

I PROCEED now to set down, what may be objected against this Opinion, or offered in Assertion of the contrary, *viz.* That these Bodies are Primitive Productions of Na-

L. ture,

ture, in Imitation of the Shells and Bones of Fishes.

AGAINST the former Opinion we have been pleading for, it may be objected, That there follow such strange and seemingly absurd Consequences from it, as are hardly reconcileable to Scripture, or indeed to sober Reason. As,

First, That the Waters must have covered the whole Earth, even the highest Mountains, and that for a long time, there being found of these Shells, not only in the most mountainous Parts of our Country, but in the highest Mountains in *Europe*, the *Appennine* and *Alps* themselves, and that not only scattered, but amassed in great Lumps, and lying thick in Beds of Sand, as we have before shewn. Now, this could hardly be the Effect of a short Deluge, which if it had carried any Shell-Fish so high, would in all Likelihood have scattered them very thin. These Beds and Lumps of them necessarily inferring, that they must have bred there, which is a Work of Time. Whereas the general Deluge, from the Beginning to the End, lasted but ten Months and thirteen Days: That is, from the seventeenth Day of the second Month of the six hundredth Year of *Noah's* Life, when the forty Days Rain began, till the first Day of the first Month of the six hundred and first Year thereof, when the Waters were dried up from off the Earth.

Neither

Neither is it less repugnant to Reason than Scripture ; for if the Waters stood so high above the Earth, for so long a time, they must, by reason of their Confluence, be raised as high above the Sea too. But what is now become of this huge Mass of Waters, equal to six or seven Oceans ; nay, to twenty or more ? May not the Stoicks here set in, and help us out at a dead Lift ? The Sun and Moon, say they, might possibly sup it all up. Yea, but we cannot allow Time enough for that ; for according to the moderate Draughts they take now-a-days, one Ocean would suffice to water them many Ages, unless perchance, when they were young and hot, they might need more Drink. But to be serious, I have no Way to answer this Objection, but by denying that there are any Beds or great Lumps and Masses of these formed Stones to be found near the Tops of the *Alps*, or other high Mountains ; but yet there might be some particular Shells scattered there by the general Deluge. Unless we should say, that those Mountains, where such Shells are found, were anciently depressed Places, and afterward raised up by Earthquakes, or subterraneous Fires. Another thing there is as difficult to give an Account of, as of the Shells getting up to the Tops of Mountains ; that is, of those several Beds or Floors of Earth and Sand, &c. one above another, which are observed in broken Mountains : For one

cannot easily imagine, whence these Floors or Beds, in the Manner of *strata super strata* (as the Chymists speak) should come, but from the Sediments of great Floods, which how or whence they could bring so great a Quantity of Earth down, when there was but little Land above the Sea, I cannot see. And one would likewise be apt to think, that such a Bed of Sands, with plenty of Cockle-Shells intermixt, as we mentioned before in the Mountain near *Bononia* in *Italy*, must have been sometimes the Bottom of the Sea. But before one can give a right Judgment of these Things, one must view the Mountains where such Layers and Beds of Earth and Shells are found; for perchance they may not be elevated so high above the present Surface of the Sea, as one would judge by the Descriptions of them. 'Tis true (says my worthy Friend Dr. *Tancred Robinson*) that some Shells might have been scatter'd up and down the Earth by Incampments of Armies, by the Inhabitants of Cities and Towns, whereof there are now no Remains. *Monsieur Loubere*, the late French Envoy to *Siam*, affirms, That the Monkeys and Apes, at the Cape of Good Hope, are almost continually carrying Shells and other Marine Bodies from the Sea-Side up to the Mountains; yet this will not solve the Matter, nor give any satisfactory Account, why these perfect Shells are dispers'd up and down the Earth, in all Climates and Regions,

Regions, in the deep Bowels of vast Mountains, where they lie as regularly in Beds, as they do at the Bottom of the Sea. This to me, I confess, is at present unaccountable.

Secondly, It would hence follow, "That many Species of Shell-Fish are lost out of the World, which Philosophers hitherto have been unwilling to admit, esteeming the Destruction of any one Species a dismembring of the Universe, and rendring it imperfect; whereas they think the Divine Providence is especially concerned to secure and preserve the Works of the Creation: And that it is so, appears, in that it was so careful to lodge all Land-Animals in the Ark at the Time of the general Deluge. The Consequence is proved, in that, among these petrified Shells, there are many Sorts observed, which are not at this Day, that we know of, any where to be found. Such are a whole Genus of Cornua Ammonis, which some have supposed to be Nautili (to which indeed they are nearly akin, but yet differ from them so much, that they ought to be accounted a distinct subaltern Genus, as I shall shew out of Dr. Plot by and by) which there have not any been seen either cast ashore, or raked out of the Sea, at any time, that ever I heard of. Nay, my very learned and honoured Friend Dr. Lister proceeds farther, and saith, That when he particularly examined some of our English Shores for Shells, and also the fresh

Waters and the Fields, that he did never meet with any one of those *Species* of Shells found at *Adderton* in *Yorkshire*, *Wansford-Bridge* in *Northamptonshire*, and about *Gunthorpe* and *Bearvoir-Castle*, &c. any where else, but in their respective Quarries. What can we say to this? Why, it is possible that many Sorts of Shell-Fish may be lodged so deep in the Seas, or on Rocks so remote from the Shores, that they may never come to our Sight.

Thirdly, It follows also, that there have been Shell-Fish in these cold Northern Seas, of greater Bulk and Dimensions than any now living; I do not say in these, but in the most Southernly and *Indian*, viz. *Cornua Ammonis*, of two Foot Diameter, and of Thickness answerable.

To this I answer, That there are no petrified Shells that do, in Bigness much exceed those of the natural Shell-Fish found in our Seas, save the *Cornua Ammonis* only, which I suspect to have never been, nor had any Relation to any Shells of Fishes; or to imitate or resemble them, at least some of them. Against this Assertion it may be objected, That there are found in *England* many *Pectinites* bigger than any Shell-Fish of that Kind which our Seas now afford. And that there are no *Nautili*, or other testaceous Fishes with us, comparable in Bigness to that *Nautilus* Stone of twenty eight Pound found by *Mr. Waller* at *Keinsbam*. To which I answer,

swer, That there may be Shell-Fish in our Seas, that do not at all; or very seldom appear, greater than we are aware of. I myself, in Company with Mr. *Willughby*, in the Streight between the *Isle* and *Calf* of *Man*, took up among the tall *Fuci* growing thick upon the Rocks there, two or three of those large *Echini Marini*, or *Sea-Urchins*, as big as a Man's two Fists, the Shells whereof we never found cast up upon the Shores of *England*, nor ever heard that any Man else did. So that I question not, but there are lodged among the Rocks, and in the deeper Places of the Sea, remote from the Shores, many different Sorts of Shell-Fish, and excelling in Magnitude those that are commonly found or known. And like enough it is, that after the Flood there were many Places deserted, and thrown up by the Sea, and become dry Land, which had been Sea before; which must needs be replete with these Bodies. As for the *Nautili*, they are much different from these *Cornua Ammonis*: For the *Nautili*, at least all the Species of them known to us, are (as Dr. *Plot* well observes) extravagantly broad at the Mouth, and have not more than two other small Turns at the most, whereas the Turns of the *Ophiomorphites* are proportionable one to another; and in Number many times four or five, and sometimes six, if we may believe *Aldrovand*. And there are *Nautili Lapidei*, which do as

nearly resemble the *Nautilus* Shells, as any other *Cochlites* do their respective Prototypes, as Mr. *Lhwyd* assures me he had observed many in *Museums*. And the learned and ingenious Mr. *Richard Waller*, then Secretary to the *Royal Society*, in a Letter to me dated *Febr. 4. ---87.* writes, That he had been lately at *Keinsbam* in *Somersetshire*, and making a Search after the *Cornua Ammonis*, found one of the true *Nautilus* Shape, covered in some Places with a shelly Incrustation, with the Diaphragms to be seen to the Center of the *Voluta*, and in each Diaphragm, the Hole by which they communicate one with another, by a String or Gut in the Fish. This was of a very hard Stone and large Size, weighing at least twenty eight Pound, though some part was broken off. Another Argument that they have no Relation to the common *Nautili*, is, that they break into Pieces somewhat resembling Vertebres, as I was first advised by the fore-remembered Mr. *Lhwyd*, and have since noted myself. I also received from that very ingenious and inquisitive Gentleman, happy in making natural Discoveries, Mr. *William Cole* of *Bristol*, such an Account of a Sort or two of these *Ophiomorphous* Bodies, as is enough to stagger any Man's Belief, if not utterly to overthrow his Opinion of their owing their Original to any Sea Shell, which take in his Words: *Among others of this Kind of Bodies which I have*

have observed, I shall instance in one, which can be reduced to none but the Ophiomorphites, which I found growing between the thin Plates of a kind of brittle blue Slate in large Rocks, some a Furlong within the full Sea-Mark, and in some where the Water comes not at highest Tides, only in great Storms, when the Waves break, it is dash'd sometimes against them, being forced up by the Winds; which being broken with a convenient Tool, will shiver all into very thin Plates; between which I have found in abundance of those Stones, but as brittle as the Slate in which they grew, and of the same Consistence; but so thin, that the broadest, being about four Inches, are not so thick as a Half-Crown Piece, some not half an Inch broad, were as thin as a Groat, and so proportionably up to the largest, covered with a Superficies as thin, and exactly of the Colour of Silver-foil: And where the Sea-water washeth them, and they are exposed to the Sun and Wind when the Tide is gone, they are tarnished; and appear of a Gold, Purple, Blue and Red; as any thing on which Silver-foil is laid, being exposed a considerable time to the Sun, Wind, and Weather, will do. These have the same Spiral Figures, and as regular as the other Serpent-Stones, and being taken off with a Knife, leave the same Impressions on both Sides of the Slate.

In some such Rocks of Slate, but much harder, I found some of those Stones of another Kind,

Kind, thick in Proportion to their Breadth, from an Inch to twenty eight Inches broad; the broadest one was at the great End (on which some Authors have fabulously reported the Head to grow) six Inches thick; all of them covered over with a white Scale, which will be taken off, one Coat under another, as Pearls, or the Shells of some Fishes. I saw some Impressions as big as the Fore-Wheel of a Chariot, &c. What shall we say to this? Were there ever any Shell-Fish in ours, or other Seas, as broad as a Coach-Wheel? or others as thin as a Groat? What is become of all this kind of Ophiomorphite Shell-Fish? And yet (which is strange) both these Kinds, by Mr. Cole's Description, seem to have been covered with Shells.

By what I have said concerning these *Ophiomorphous* Stones not to have been *Nautili*, I would not be thought to reflect upon, or detract from the Veracity or Exactness of the Observations of Dr. Robert Hook, whom for his Learning and deep Insight into the Mysteries of Nature, I deservedly honour. I question not, but he found in the *Keinsbam* *Ophiomorphites*, perfect Diaphragms of a very distinct Substance from that which filled the Cavities, and exactly of that kind which covered the Outside, being for the most part whitish, or Mother of Pearl coloured. Mr. Waller fore-mentioned, attests the same, writing in his Letter to me of Febr. 4. 1687. that

that in the ordinary Snake-Stones there, the shelly Diaphragms were very visible. In this respect they do resemble *Nautili*; though for their Figure they are much different, and of a distinct Genus. I never broke any of the *Keinsham* Stones, but of those found about *Whitby* in *Yorkshire* many; but could not observe in them any Shell-like Diaphragms, only they broke into such Pieces as I mentioned before. And my dear and much honoured Friend, Dr. *Tancred Robinson*, writes me, That he had broken several *Cornua Ammonis*, but could never find any Diaphragms or Valves in them, though he confelleth Mr. *Woodward* shew'd him one with such, in his curious Collection of Petrifications. So that these Diaphragms are not to be found in all the Sorts of them. But if they be found in some, it is a strong Presumption, that they were at first in all, however they came to disappear.

UPON farther Consideration, I find Reason to agree with Dr. *Hook*, and other Naturalists, That these *Cornua Ammonis* are of the same Genus with *Nautili*, and differ only in Species. But yet these Species are subaltern Genera, each having divers Species under it.

IN fine, these *Ophiomorphous* Stones do more puzzle and confound me, than any other of the formed Stones whatsoever, because, by Dr. *Hook*'s Description of those of *Keinsham*, they seem to have been, or to
owe

owe their Original to Shells ; and yet there is nothing like them appears at this Day in our or any other Seas, as far as I have seen, heard, or read.

To this may be answered, as *Scilla* doth to the like Objection against the *Maltese* Shells, &c. ‘ And whereas it is objected, (saith he) that great Quantities of Shells are found in *Malta* which are foreign to those Seas, that is of no Force, since it is well known, that every Easterly and South-Easterly Wind throws whole Beds of beautiful Shells upon the *Calabrian* Coast, none of which Kind of Shell-Fish are taken by Fishermen in those Seas.” The same Answer he returns to the Objection of the *Echini Spatagi*, being very rarely seen about *Malta*, and yet that great Numbers of the Shells of that Species of *Echinite* have been found there, viz. That he himself, in less than an Hour’s time, hath taken them up by hundreds in the Port of *Messina*, where that sort of Shell-Fish is as rarely to be found as at *Malta*.

In like manner, these *Cornua Ammonis*, though altogether Strangers to our Seas, might as well be brought higher by Force of Winds or Stress of Weather, much more than by the general Deluge, in which the Fountains of the great Deep were broken up. Especially if we consider, that several *East-India* Fruits have been brought over the vast

vaſt Ocean, and caſt upon the Weſtern Iſlands of Scotland.

Thirdly, A ſecond Argument to prove theſe formed Stones never to have been Shells, Dr. * *Plot* affords us, ‘ Because that e-
 ‘ ven thoſe Shells, which ſo exactly repreſent * *Hiſt.*
 ‘ ſome ſorts of Shell-Fiſh, that there can be no *Nat. Oxf.*
 ‘ Exception upon the account of Figure, but *p. 117.*
 ‘ that they might formerly have been Shells
 ‘ indeed, at ſome Places are found only with
 ‘ one Shell and not the other. Thus in *Cowley*
 ‘ Common [in *Oxfordſhire*] we meet only with
 ‘ the gibbous, not the flat Shell of the petri-
 ‘ fied *Oyſter*, and ſo of the *Eſcallop-Stones* in
 ‘ the Quarries near *Shotover*; which if they
 ‘ had once been the Shells of *Oyſters* and *Eſcal-*
 ‘ *lops*, had ſcarce been thus parted.” To this
 I anſwer, That this Argument is not neceſ-
 ſarily concluſive, becauſe there may poſſi-
 bly be ſome reaſon of it, though we know
 it not, nor can eaſily imagine any. The
 like Anſwer may be returned to his next
 Argument.

Thirdly, ‘ Because (ſaith the Doctor) I
 ‘ can by no means ſatisfy myſelf, how it
 ‘ ſhould come to paſs, that in caſe theſe Bo-
 ‘ dies had once been moulded in Shells,
 ‘ ſome of the ſame Kind ſhould be found in
 ‘ Beds, as the *Conchites* at *Langley*, *Charl-*
 ‘ *ton*, *Adderbury*, and others ſcattered, as at
 ‘ *Glypton*, and *Teynton*, and ſo the *Oſtra-*
 ‘ *cites* at *Shotover* and *Cowley*. Nor how it
 ‘ ſhould

‘ Should fall out, that some of these Bi-
 ‘ valves should always be found with their
 ‘ Shells separate, as the *Ostracites* and *Pe-*
 ‘ *elines*: And others always closed togge-
 ‘ ther, as the *Conchites* in all Places I have
 ‘ yet seen.

Fourthly, ‘ Because many of these formed
 ‘ Stones seem now to be *in fieri*, (which
 ‘ is the Doctor’s next Argument) as the
 ‘ *Selenites* at *Shotaver* and *Hampton-goy*, the
 ‘ *Conchites* of *Glympton* and *Corntwall*, ma-
 ‘ ny of which were of a perfect Clay, and
 ‘ others of Stone, &c.” As for the *Selen-*
nites, I grant them to have been *in fieri*,
 because they are formed after the manner
 of Salts by Shooting or Crystallization; but
 concerning the Clay Cockles, I say with
 the Civilians, *ampliandum*. Since the pub-
 lishing of this Treatise, happening to read
 Dr. *Nicol. Steno*’s Discourse concerning these
 Bodies, in his *Description* of a *Shark’s Head*,
 I met with a very plausible Solution of
 this Argument or Objection. *First*, he gives
 us the History of these Bodies, or his Obser-
 vations concerning them; of which these
 following are two: 1. That in *Argilla*, which
 some *English*, *Potters Earth*, and we may ren-
 der a fat Clay, he had taken Notice that
 there were Plenty of them on the *Superficies*
 of the Earth, but within the Earth but a few.
 2. That in the same *Argilla*, the deeper you
 descend downward, the more tender those
 Bodies

Bodies are, so that some of them at any the least Touch fall into Powder : And they also that were on the *Superficies*, almost all of them were without much ado reduced into a white Powder. Now (saith he) seeing in such kind of Earth, by how much deeper those Bodies lie, by so much the softer they are, and do less bear the Touch, the Earth is so far from producing them, that it doth rather destroy them. Neither is there any reason to think, that they are therefore softer, because they are not yet arrived at their Perfection, or come to Maturity : For those Things that are soft upon that account, while they are in generating, have their Parts united to one another, as it were by a kind of Glue (as is seen in the tender Shells of Pine-Nuts or Almonds). but these Bodies, being deprived and destitute of all Glue, easily moulder to Dust. Nor is it any Objection against our Opinion, that on the Surface of the Earth their Number seems to increase, for that is owing to Rains washing away the intermediate Earth; but rather their Consistence when they are on the *Superficies*, being tender and easily crumbled into Dust, doth demonstrate, that their Destruction, begun in the Earth, was interrupted by the Intervention of the Rain. But to give these Arguments their Due, tho' they be not demonstrative Proofs, yet they infer a great Degree of Probability, and shrewdly urge and shake the contrary Opinion.

THE

THE other Arguments the Doctor alleges, admit a plausible Solution, excepting such as we have already touched, and given as good an Answer to, as either the Matter will admit, or we were able to give.

To the first, That there are found Stones resembling Shell-Fish that stick to Rocks : I answer, That many of them might, by Accident, be rubb'd off the Rocks they stick to, or thrust off by Birds insinuating their Bills between the Shell and Rock, to feed upon their Meat ; but by what means soever it be, that they are sometimes broken off, the Matter of Fact is certain ; for we find many *Patella* cast upon the Shores by the working of the Sea ; Why then might they not be brought up by the Flood ?

To the second, Why might not the Bones of Whales, Sea-Horses, all squamose Fishes, the great Shells of the *Buccina*, *Murices*, *Concha Veneris*, and *Solenes*, and almost all the crustaceous kind, as *Crabs* and *Lobsters*, &c. as well have been brought up and left behind by the Flood, and afterward petrified, as any of the testaceous kind ? I answer, Of the great *Buccina*, *Murices* and *Concha Veneris*, there are very few or none found in our Seas : It may be there are of them in the Mountains and Quarries of the *Indies*, were any Man so curious as to search them out : Though it's likely but few, because being great Things, easy to be seen, and that Part
of

of the World having been fully peopled soon after the Flood, their Beauty might invite the Inhabitants to search them out, and gather them up. But, *Secondly*, Those other Kinds may possibly be less durable, and more apt to be wrought upon, to moulder, decay, and be dissolved in time by the Weather, Rains and Moisture of the Earth, or were not so susceptible of petrifying Juices.

THE Third Argument is already answered in the precedent Discourse.

To the Fourth Argument, as to what concerns the *Selenites*, *Astroites* and *Belemnites*, we have answered already. That the Species of *Brontia* cannot be the petrified Shells of *Echini Spatagi*, the Arguments the Doctor alledges out of *Aristotle* and *Rondeletius* do not evince. For though in some Seas they may be *πελάγοι καὶ σπάνιοι*, yet in others are they plentiful enough. In our own Seas, at *Llandwyn* in the *Isle of Anglesey*, we may reasonably conjecture, they are more plentiful than the common *Echini* any where with us; because we found more of their Shells cast up there on the Shore, than of the *Echini* in any Shore about *England*: Nay, so common are they there, that even the Vulgar have taken Notice of them, and imposed a Name upon them, calling them *Mermaids Heads*. And tho' their Bristles or Prickles were but small, yet were they not few or thin set, as *Rondeletius* saith.

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How

How the Snake-Stones about *Huntly-Nab* in *Whitby* in *Yorkshire* came to be included in Globular or Lenticular Stones, is not difficult to make out; for the Cliffs thereabout being Allom-Stone or Mine, wherein these Snake-Stones lie, the Sea in Spring-Tides and tempestuous Weather undermines and throws down Part of the Shore or Cliffs, which by the Fall break in Pieces, and the *Ophiomorphous* Stone being harder than the rest of the Cliff, is broken off from it by the Fall, or its Volutation in the Sea afterward, with some Part of the Cliff or Allom-Stone sticking to each Side of it where it is concave, and by reason of its Figure and *Striae*, cannot easily part from it.

Lastly, To dissemble nothing, I have myself observed some Cockle-Stones to have seemingly different Impressions or *Striae* upon the same *Superficies*; which *Phænomenon* it is very hard to give an Account of. I have also observed a large Stone almost as hard as Marble, that was so marked every where throughout with the Impressions of Cockles and their *Striae*, so crossing one another in every Part of it, that if it were nothing but Shells amassed together by a stony Cement, those Shells must have, before their Concretion, been broken into infinite small Pieces or Fragments, scarce any remaining entire; which I do not see how any Floods, or Working of the Sea, could possibly effect.

So

So I have finished what I had to say concerning this supposed Effect of the *Deluge*, the Bringing in of Shells, and Scattering them all over the dry Land. But yet I must not dismiss this Particular, till I have said something to an Objection that presently occurs to any one who considers this Matter. The Waters of the Flood having been supplied, partly by Rains, partly by the Breaking up of the Fountains of the great Deep, and not by an Irruption or Inundation of the Sea, how could any Sea-Shells at all be brought in by it?

To this I answer, That the great Deep communicates with the Sea; and the Waters rising up out of the subterraneous Abyss, the Sea must needs succeed, else would there have been an empty Space left in the Middle of the Earth, so that the Shell-Fish might as well come in this Way from the Bottom of the Sea, as by an Inundation: In like manner, as the Fish in the Lake of *Carniola*, called the *Zirchnitzer Sea*, do descend annually under Ground through many great Holes in the Bottom, and return again by the same Holes. To all this I might add, that into the Lands near the Skirts of the Sea, and lower Hills, these Shells might in part be brought by particular Floods, of which many we read of, and more possibly than are recorded in any History, may have happened since the general *Deluge*. Hence the chief Champions of the Opinion

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of *Mock-Shells* are not difficult to grant, that in some Countries, and particularly along the Shore of the *Mediterranean-Sea*, there may all manner of Shells be found promiscuously included in the Rocks or Earth, and at good Distances too from the Sea. Which are the Words of Dr. *Lister*, repeated and approved by Dr. *Plot*. But this will not serve their Turn; for we have before proved, that in the middle Part, and near the Center of our own Country, at a great Distance from the Sea, viz. in *Oxfordshire*, there are found not only Shell-like Stones, but real Shells, or Mock-Shells, (as some esteem them) for Figure, Colour, Weight, Consistency, or any other Accident, not to be distinguished from true Shells; and that not such as have been accidentally scattered there, but digg'd out of the Ground in Plenty, and of Filhes that are rarely found in our Seas: Patterns whereof were sent me by my ingenious Friend Mr. *Lbwyd*, who, I hope, will, e'er long, gratify the Curious, by publishing a general Catalogue of all the *formed Stones* found in *England*, and his Remarks upon them.

AND I have likewise proved by good Authority, that beyond the Seas, in high Mountains, and many Leagues distant from the Sea too, there have been Beds of real Shells. I might have added *Sharks Teeth*, or *Glossopetra*, as both *Goropius Becanus*, and *Georgius Agricola*, testify; if not in Beds, yet plentifully

tifully dispers'd in the Earth. There are several Medical Histories extant (as Dr. *Tancred Robinson* informs me) of perfect Shells found in Animal Bodies, in whose Glands they were originally formed, which is a considerable Objection, not easily to be removed.

DR. *Woodward*, and others, suppose these Shells, and other Bodies, to be disposed and ranged in the Earth according to their specific Gravity; and for the solving or giving an Account of this *Phænomenon*, hath advanced a strange and bold *Hypothesis*.

‘ DURING the Time of the Deluge,
 ‘ (*said he*) whilst the Water was out upon,
 ‘ and covered the terrestrial Globe, all the
 ‘ Stone and Marble of the *Antediluvian*
 ‘ Earth, all the Metals of it, all Mineral Con-
 ‘ cretions, and, in a word, all Fossils what-
 ‘ soever, that had obtained any Solidity,
 ‘ were totally dissolved, and their constituent
 ‘ Corpuscles all disjoined, their Cohæsion
 ‘ perfectly ceasing. That the said Corpuscles
 ‘ of these solid Fossils, together with the Cor-
 ‘ puscles of those which were not before so-
 ‘ lid, such as Sand, Earth, and the like; as
 ‘ also Animal Bodies, and Parts of Animal
 ‘ Bones, Teeth, Shells; Vegetables, and
 ‘ Parts of Vegetables, Trees, Shrubs, Herbs;
 ‘ and to be short, all Bodies whatsoever, that
 ‘ were either upon the Earth, or that consti-
 ‘ tuted the Mass of it, if not quite down to
 ‘ the Abyss, yet, at least, to the greatest
 M 3 Depth

‘ Depth we ever dig : I say, all these were
 ‘ assumed up promiscuously into the Water,
 ‘ and sustained in it in such manner, that the
 ‘ Water and Bodies in it together, made up
 ‘ one common confused Mass.

‘ THAT, at length, all the Mass that was
 ‘ thus borne up in the Water, was again pre-
 ‘ cipitated, and subsided towards the Bot-
 ‘ tom : That this Subsidence happened ge-
 ‘ nerally, and as near as possibly could be
 ‘ expected in so great a Confusion, according
 ‘ to the Laws of Gravity : That Matter, Bo-
 ‘ dy, or Bodies, which had the greatest Quan-
 ‘ tity, or Degree of Gravity, subsiding first
 ‘ in Order, and falling lowest : That which
 ‘ had the next, or a still lesser Degree of
 ‘ Gravity, subsiding next after, and settling
 ‘ upon the precedent, and so on in their se-
 ‘ veral Courses : That which had the least
 ‘ Gravity not sinking down till last of all,
 ‘ settling at the Surface of the Sediment, and
 ‘ covering all the rest : That the Matter
 ‘ subsiding thus, formed the *Strata* of Stone,
 ‘ of Marble, of Cole, and the rest; of which
 ‘ *Strata* lying one upon another, the terre-
 ‘ strial Globe, or at least as much of it as is
 ‘ ever displayed to View, doth mainly con-
 ‘ sist : The *Strata* being arranged in this
 ‘ Order, meerly by the Disparity of the Mat-
 ‘ ter of which they consisted, as to Gravity,
 ‘ and there being Bodies of quite dif-
 ‘ ferent Kinds, Natures and Constitutions,
 ‘ that

‘ that are nearly of the same specifick Gravity, it thence happened, that Bodies of quite different Kinds subsided at the same instant, and fell together into, and composed the same *Stratum*: That, for this Reason, the Shells of Cockles, Escallops, Periwinkles, and the rest, which have a greater Degree of Gravity, were enclosed and lodged in the *Strata* of Stone, Marble, and the heavier Kinds of terrestrial Matter; the lighter Shells not sinking down till afterwards, and so falling among the lighter Matter, as Chalk, and the like, &c.” This being the Main of his *Hypothesis*; for the rest I refer to the Book.

I SHALL not at present examine it, but reserve that Task till the Publication of his larger Work, wherein we expect it will be confirmed, and all Difficulties cleared up. I shall only add, that we have sufficient Authorities to prove, That that *Phænomenon*, for the solving whereof, I suspect he invented this *Hypothesis*, viz. That these Bodies are arranged and lodged in the Beds, according to their specifick Gravity, is not generally true; but that they are often mingled heavy with Light in the same Bed or *Stratum*.

REFLECTING upon the Length of this Discourse concerning the Original of these Bodies, I am suspicious that the vulgar and inconsiderate Reader will be ready to demand,

mand, *What needs all this ado? To what purpose so many Words about so trivial a Subject? What Reference hath the Consideration of Shells and Bones of Fishes petrified to Divinity?* Wherefore I shall, in a few Words, shew the great Importance of this Disquisition, concerning formed Stones, and the Determination of their Original.

For, *First*, If we adhere to their Opinion, who hold them to have been original Productions of Nature, in imitation only of the Shells and Bones of Fishes; we put a Weapon into the *Atheist's* Hands, affording him a strong Argument, to prove, that even Animals themselves are casual Productions, and not the Effects of Counsel or Design. For, to what End are these Bodies curiously figured and adorned? If for no other, but to exhibit such a Form, for the Ornament of the Universe, or to gratify the Curiosity of Man; these are but general Ends: Whereas the Parts of every Species of Body are formed and fitted to the particular Uses and Conveniences of that Body. And if Nature would delineate or imprint Figures upon Bodies, only to be Spectacles to Man, one would think it should not have made choice of those of the Shells and Bones of Fishes, but rather of such as were absolutely new and different from any frequently seen, or belonging to Animals; which serve rather to amuse than delight him. But, *Secondly*, We find in the Earth,

Earth, not only Stones formed in Imitation of Shells, but real Shells, Teeth and Bones of Fishes, or Bodies so like them, that they are not to be distinguished by Figure, Texture, Colour, Weight, or any other Accident. Now, what greater Argument can the Atheist desire, to prove, that the Shells of Fishes were never designed by any provident Efficient for their Defence, or their Bones for the sustaining of their Bodies, but that the Fish and Shell containing it, and the Bones sustaining it, did casually concur; than that there should be real Shells produced without any Fish in them, and that in dry Places, where no Fish ever did or could breed, or indeed live, and real Fish-Bones, where there never was nor could be any Fish?

DOTH it not then concern a Divine to be acquainted with this Objection against the Bodies of Animals being the Effects of Counsel and Design, and provided with an Answer to it. For my part, I must needs confess, that this Argument weighs so with me, whether from that innate *Prolepsis* myself, and I think most other Men, have of the Prudence of Nature in all its Operations, or from mine own observing that in all other things, it acts for Ends, that it is alone sufficient to preponderate all the Arguments for the contrary Opinions, tho' I acknowledge them to be of great Force, and hard to be answered; and to incline, or rather constrain me

me to allow, that these Bodies were either real Bones and Shells of Fishes, or owe their Figure to them. I cannot (to use the Words of *F. Columna*) prevail with myself to believe, that Nature ever made Teeth without a Jaw, or Shells without an Animal Inhabitant, or single Bones, no not in their own proper Element, much less in a strange one. Who even of the Vulgar, beholding any considerable Part of an Animal which he sees not the Use of, is not apt presently to ask what it serves for, as by that innate *Prolepsis* I mentioned before, presuming it was not made in vain, but for some End and Use. Suppose any of us should find in the Earth the complete *Skeleton* of a Man, he must be as credulous as the Atheist, if he could believe that it grew there of itself, and never had Relation to any Man's Body. Why then should we think that the entire *Skeletons* of Fishes, found sometimes in the Earth, had no other Original? nor ever were any Part of living Fishes.

Secondly, If we choose and embrace the contrary Opinion, *viz.* That these Bodies were the real Shells and Bones of Fishes, or owe their Figures to them, we shall find that this also is urged with many and almost insuperable Difficulties, the Principal of which I have already produced, and shall here omit, repeating only two that referr to Divinity.

I. THESE

I. THESE Bodies being found dispersed all over the Earth, they of the contrary Opinion demand how they come there? If it be answered, That they were brought in by the general Deluge, in Contradiction thereto they argue thus: If these Stones were found scattered singly and indifferently all the Earth over, there might be indeed some reason to imagine that they were brought in by the Flood; but being found in some particular Places only, either lying thick in great Beds of Sand and Gravel, or amassed together in huge Lumps, by a stony Cement, such Beds must in all Likelihood have been the Effect of those Animals breeding there for a considerable time; whereas the Flood continued upon the Earth but ten Months and thirteen Days, as I have before shewn; and yet there are found of these Bodies upon very high Mountains, not excepting the *Apennine* and *Alps* themselves. Whence they conclude, that they were neither brought in by the Flood, nor bred during the Flood, but some other way produced. For if they were the Shells of Fishes, or their Bones, the Water must needs have covered the whole Earth, even the Mountains themselves, for a much longer Time than is consistent with the Scripture History of the Flood, and therefore we must seek some other Original of these Bodies.

IF we stick to the Letter of the Scripture History of the Creation, that the Creation of Fishes succeeded the Separation of Land and Sea, and that the six Days wherein the World was created, were six Natural Days, and no more ; it is very difficult to return a satisfactory Answer to this Objection : I shall therefore only add a Conjecture of my own, and that is, That possibly, at the first Creation, the whole Earth was not all at once uncovered, but only those Parts whereabout *Adam* and the other Animals were created, and the rest gradually afterwards, perchance not in many Years ; during which time these Shell-Fish might breed abundantly all the Sea over, the Bottom whereof being elevated and made dry Land, the Beds of Shell-Fish must necessarily be raised together with it.

THIS Conjecture hath no sufficient Ground to support it, and therefore I do not insist upon it. But, truly, if it had, I see not any better Account could be given of all the *Phænomena* of them, than from thence might.

2. It will hence follow, that many Species of Animals have been lost out of the World, which Philosophers and Divines are unwilling to admit, esteeming the Destruction of any one *Species* a Dismembring of the Universe, and rendring the World imperfect ; whereas they think the Divine Providence is especially concerned ; and solicitous to secure and preserve the Works of the

the Creation. And truly so it is, as appears, in that it was so careful to lodge all Land Animals in the Ark at the Time of the general Deluge; and in that, of all Animals recorded in Natural Histories, we cannot say that there hath been any one Species lost, no not of the most infirm, and most exposed to Injury and Ravine. Moreover, it is likely, that as there neither is nor can be any new Species of Animals produced, all proceeding from Seeds at first created; so Providence, without which one individual Sparrow falls not to the Ground, doth in that manner watch over all that are created, that an entire Species shall not be lost or destroyed by any Accident. Now, I say, if these Bodies were sometimes the Shells and Bones of Fish, it will thence follow, that many *Species* have been lost out of the World: As for Example, those *Ophiomorphous* ones, whose Shells are now called *Cornua Ammonis*, of which there are many Species, none whereof, at this Day, appear in our or other Seas, so far as I have hitherto seen, heard or read. To which I have nothing to reply, but that there may be some of them remaining somewhere or other in the Seas, though as yet they have not come to my Knowledge. For though they may have perished, or by some Accident been destroyed out of our Seas, yet the Race of them may be preserved and continued still in others. So though Wolves and

and Bevers, which we are well assured were sometimes native of *England*, have been here utterly destroyed and extirpated out of this Island, yet there remain Plenty of them still in other Countries.

By what hath been said concerning the Nature and Original of Stones, I hope it may appear, that this is no idle and unnecessary Discourse, but very momentous and important: And this Subject, as mean as it seems, worthy the most serious Consideration of Christian Philosophers and Divines; concerning which, though I have spent many Thoughts, yet can I not fully satisfy myself, much less then am I likely to satisfy others.

BUT I promise myself and them more full Satisfaction shortly, from the Labours of those who are more conversant and better acquainted with these Bodies than I, who have been more industrious in searching them out, and happy in discovering them; who have been more curious and diligent in considering and comparing them, more critical and exact in observing and noting their Nature, Texture, Figure, Parts, Places, Differences, and other Accidents, than myself, and particularly that learned and ingenious Person before remembred.

ACCORDING to my Hope and Expectation, since the Publishing of this Work, my learned and ingenious Friend, Mr. *Edward Lhwyd*, hath

hath gratified the curious and inquisitive Naturalists, with the Edition of his excellent *Lithophilacium Britannicum*, or Classical Distribution of Stones and other *British* Fossils, remarkable for their singular Figure, as many as either himself hath hitherto found out, or received from Friends. To which he hath subjoined several Epistles relating to this Subject; the last of which, concerning the Original and Production of these Bodies, he hath done me the Honour to inscribe to me; which at my Request he hath translated into *English*, and enlarged with many Additions, which I shall here give the Reader.

THE SIXTH LETTER.

Of the Origine of Marine Fossils, Shells, and Mineral Leaves, &c.

To Mr. RAY.

Honoured Sir,

YOU are pleased to ask, whether, after some Years Observations, I have been at length able to satisfy myself, as to the Origine of what we call *Marine Fossils*, and those other Bodies no less surprizing, which (to distinguish them from other Plants) I have taken the Liberty to call *Mineral Leaves*; viz. Whether I conclude, with

*Pl. Nat.
Hist. Ox-
on. p.

with the general Opinion, that they have been repositied in the Places we find them, at the universal Deluge, and so preserv'd to our Time; or that they are original Productions of Nature, there form'd from some Plastick Power of Salts, or other Minerals, which was the Conjecture of the late Dr. Plot*, and other experienc'd Naturalists. To this I must needs answer, That the frequent Observations I have made on such Bodies, have hitherto afforded little better Satisfaction, than repeated Occasions of Wonder and Amazement; for as much as I have often (I may almost say continually) experienc'd, that what one Day's Observations suggested, was the next called in Question, if not totally contradicted and overthrown. Nevertheless, so indefatigable is the Curiosity, and indeed so successful have been the Discoveries of this present Age, that we are daily encouraged to hope, this so important a Question will not much longer want its final Determination, to the great Advancement of that Kind of real Knowledge which relates to Minerals: A Part of Natural History which, you well know, hath been hitherto much more neglected, than that of Plants and Animals; only, as I presume, because these Bodies are less obvious to our View, and much more abstruse and unaccountable as to their Origine. I therefore, at spare

Hours,

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Hours, continue to improve my Collection; in regard it may be hoped, that from an accurate Inspection of it, some others hereafter may frame several useful Inductions; which I myself never had the least Thoughts of. And in the mean time, because the Communicating to our Friends, what carries but some Shadow of Probability, does often contribute somewhat towards the speedier Discovery of the Truth, I shall here submit to your Examination, a Conjecture relating to the Origine of these Bodies, which I know not whether any other have as yet thought of: But in regard it is necessary, that before any new Opinion be proposed, Reasons be offer'd against those already received, give me leave here to lay before you some Objections against both the above-mentioned Accounts of the Origine of these Bodies. To begin, therefore, with that which referrs all these Marine Fossils and Mineral Leaves, Stalks, and Branches, &c. to the Deluge, I have several Reasons to offer against it, whereof (because I would not presume too much on your Time and Patience) I shall at present only propose these few:

First, Therefore, as to the Marine Fossils, had these Bodies been Spoils of the Sea, brought on the dry Land by an Inundation, they would (for the Generality of them at least) either have been left on the

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Sur-

' Surface of the Earth, or have been lodg'd
 ' at no very great Depth under it ; but I
 ' have found them buried (or inclos'd) with-
 ' in solid Marble on the *Face* of broken Sea
 ' Cliffs, of the Height of 200 Fathoms and
 ' more, from the Tops thereof to the Bot-
 ' tom, and observ'd them to be so continu'd
 ' under the Sea - Water ; nor was that
 ' only upon the Face of these Rocks, but
 ' even, more or less, throughout the whole
 ' Mass of them. And this is manifest from
 ' divers Rocks hewn down by Workmen for
 ' making of Lime, and other Pieces casually
 ' fallen from the Cliffs in the Isle of *Caldey*,
 ' and elsewhere about *Tenby* in *Pembroke-*
 ' *shire* ; as also in several other Rocks and
 ' Mountains that consist of such Bastard Mar-
 ' ble, or Lime-stone, throughout *Wales*, *Ire-*
 ' *land*, and other Countries. Now, altho'
 ' we should grant, that at the Time of the
 ' Deluge these Rocks were no other than
 ' Clay or Earth ; and that, therefore, Sea-
 ' Shells, Corals, and other Marine Bodies,
 ' might by the Violence of the Inundation
 ' have been lodg'd therein ; and that in Tract
 ' of Time, this suppos'd Clay or Earth con-
 ' solidated into Lime-stone : I say, though
 ' we should grant all this, yet I cannot per-
 ' ceive by what Force such Bodies could be
 ' sunk into Clay or Earth to so great a Depth.
 ' If indeed these Bodies constituted one con-
 ' tinued Mass, so as that one should bear
 ' hard

hard on the other, something perhaps might be reply'd ; but the Matter is clearly otherwise, for they are found so confusedly dispers'd throughout the Mass of Lime-stone, sometimes at the Distance (for Example) of three Foot from each others ; sometimes two, sometimes within half an Inch, and not seldom two or three or more of them contiguous.

Secondly, Such *Marine Fossils* have been observ'd on the Sides or Walls within our Lime-stone Caves, and are even sometimes found sticking to the Roofs of them ; for I have gather'd *Cuthbert-Beads*, or *Entrochi*, which are *Vertebrae* of Sea-Stars, from the Roof of a Cave call'd *Lhygad Lhychwr*, near *Kerrig Kennen* Castle, in the County of *Caermarthen* ; and on the Sides (as well as Bottom) of a noted Cave, call'd *Porth-Gogo* at *Ystrad-Velhte* in *Brecknockshire*, I have observ'd several Remains of Cockles, half worn by the Swift Current of the River *Melhte* which runs through this Cave, and polishes its Lime-stone. Now, although I can readily grant, that the Deluge might have cast Marine Bodies into these and any other Caves, yet can I not allow that it could ever fasten them to their polite Roofs and Sides ; and that they should be sunk so deep from the Top, is the Difficulty of the former Objection. To this may be added, that such Lime-stone Caves

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are

*v. Lith.
Br. p.

are for the most part (as it were) wain-
scoted with a stony Crust of *Stalagmites*;
which is of no very old Date, but owing
to the continu'd Dropping or Distillation of
the Caves, in which if any Marine-like
Bodies are found, as I can assure you the
Entrochi * are, I leave it to yourself, and o-
ther unprejudiced Observers, to consider of
their Origine.

Thirdly, The third Reason for my que-
stioning whether all these Things be the
Effects of the Deluge, is, for that the Bones,
Horns and Hoofs of Land-Animals, are
very seldom, if at all, found inclos'd in so-
lid Marble, or other Stone; whereas see-
ing all perished in the Deluge, the Spoils
of the Land might be expected (in Propor-
tion) as well as those of the Sea.

Fourthly, Some Fossil-Shells are entirely
compos'd of a Spar or Crystal, insomuch
that there is no Distinction of a containing
and contain'd Matter, but only a Crystal-
line Body, of the Figure of a Shell, as is
by *Steno* himself acknowledg'd; and as
may be seen in mine, and other Cabinets
of Form'd Stones. How so great a Change
should happen to Sea-Shells, and yet their
Shape or outward Form not violated, seems
to me too difficult to explain. The like
may be said of the Fossil Fish-Teeth, for
these are not always of the same Matter,
as

as may be observ'd from divers Specimens in my Collection.

Fifthly, 'Living Animals are sometimes found in these Fossil-Shells; for in *Misson's Travels to Italy*, we read of a Lobster found alive in the midst of a Marble near *Tricoli**; and the late Description of *Orkney*, &c. gives us the like Account of Cockles†. Moreover, as I am credibly informed, some Workmen very lately digging for the Foundation of a Building, near the Town of *Mold* in *Flintshire*, met with several Muscles at about three Foot Depth in the Gravel, which had living Fish in them. Now as it would be absurd to imagine these Animals could live since the Flood, so neither can we suppose that such Creatures being left there by the Deluge, should propagate their Kind ever since; for in this case, there must have been left in that Place a Heap of their Shells.

Sixthly, Had these Marine Bodies been repositied in the Earth at the universal Deluge, such of them as adhere to each others, may all of the same Pits or Quarries, unless their Beds be of a different Matter,

* *Misson's New Voyage to Italy*, Vol. 2. p. 44. Engl. Edit.

† *A Gentleman in the Parish of Dunresness in Zetland, told one of the Ministers of this Country, that about five Years since, a Plough in this Parish did cast up fresh Cockles, though the Place where the Plough was going was three quarters of a Mile from the Sea, which Cockles the Gentleman saw made ready and eaten.* *Brand's Descrip. of Orkney, Zetland, &c.* p. 115.

† *Sten.*
Prod. p.

‘ must necessarily have undergone the same
 ‘ Change; whereas *Steno* acknowledges, that
 ‘ he has found Testaceous Shells, adhering
 ‘ to one perfectly Crystalline †: And I have
 ‘ myself often gather’d some Crystalline Spec-
 ‘ imens, and others Testaceous of the same
 ‘ Sort of Shell, in the same Quarry, and in
 ‘ the same *Stratum* or Layer.

‘ *Seventhly*, The immense Quantity we
 ‘ have of Marine Fossils, seems no ways to
 ‘ plead for the Origine from the Deluge:
 ‘ For we may observe many thousands of
 ‘ great Stones, and even broken Pieces of
 ‘ Lime-stone Rocks throughout *Wales*, and
 ‘ the North of *England*, almost wholly com-
 ‘ pos’d of those *Vertebrae*, or broken Pieces
 ‘ of the *Radii* of Sea-Stars, which are com-
 ‘ monly call’d *Fairy-Stones*, and *Cuthbert-*
 ‘ *Beads*, whereas ’tis very rare to find on
 ‘ our Shores, three broken *Radii*, or Frag-
 ‘ ments of any Sort of Sea-Stars close toge-
 ‘ ther. Likewise one shall rarely find in the
 ‘ same Place, two single Teeth of any Fish
 ‘ on all our Coasts; whereas thousands of
 ‘ these Fossil Teeth, exactly answering those
 ‘ of divers Sorts of Sea-Fish, have been of
 ‘ late Years found in Quarries and Gravel-
 ‘ Pits about *Oxford*; nor is their Quantity at
 ‘ all diminished upon breaking new Ground.

‘ *Eighthly*, Some of these Marine Fossils
 ‘ are no other than as it were Shadows or
 ‘ superficial Representations of Sea Bodies:

‘ Nor

Nor do they seem to have much more of
 the Matter or Consistence of those Bodies
 they mostly resemble, than a Picture hath
 of the Person or Thing it represents. And
 of this Kind is Dr. Lister's *Pectinites Mem-*
branaceus out of Cole-pits; * The Mock-
 plaice, or *Buglossa curta strigosa* of Caer-
 marthenshire, and † the *Islebian* Fish-Stones
 in Germany, of which *Olaus Wormius* gives
 us this following Account. In the *Islebian*
 Slat (saith he) are seen sometimes a small
 Dust of the Golden Pyrites, which represents
 various Figures of Animals. I have a large
 Piece of this Stone, which so lively expresses
 all the Lineaments of a Barbel in golden
 Colour, that the Scales, the Fins, the Tail,
 the Head, &c. could not possibly, by any Ar-
 tist, be ever better painted. The Bodies of
 these Fish are not converted into Pyrites; so
 that we have but just the outward Linea-
 ments of them, and not the least Impression
 left of any Bones, or other Parts. We find
 ourselves therefore oblig'd to confess, that
 Nature reserves many things from our Know-
 ledge, the true Reasons whereof no Man will
 ever so far discover, as to be enabled to ren-
 der us a due Account of them. Now as these
 Representations are neither Animals them-
 selves, nor the *Exuvie* of Animals, so nei-
 ther can they be their Impressions, foras-
 much as these Lineaments are prominent;
 not impress'd: And as for the Impression
 they

* *Append.*
ad Tract.
de Anim.
Angl. &
Conch. A-
nat. Part.
Alt.

† *Lith.*
Brit. p.
96. Tab.
22. N. 2.

they make on one Side in the incumbent Stone, or other Matter, it seems not satisfactory, because I cannot well conceive how all the *Vertebrae* of a Fish, whereof many are frequently found in our Midland Quarries and Gravel-pits, should here be totally consum'd, and the Surface only of one Side be converted into this *Pyrites*, or *Marchasite*.

Ninthly, Another Obstacle of my Assent to their being all of Diluvian Origine, is the vast Number of unknown Marine Fossils, so commonly met with throughout most Counties of *England*; such as we have nothing like, neither in our Sea Shores, nor rak'd by Dredges out of the Bottom of the Sea, by the Oyster Fishermen, and others who have been employed by curious Persons on set Purpose. I have in my Collection above forty different Species of the *Fossil Nautili*, or those Shell-Stones, a great many Sorts whereof are commonly call'd *Cornua Ammonis* *; and have observ'd Plenty of most of these Species (broken or whole) in the Fields, Quarries, and Clay-Pits of the Midland Counties of *England*: Nor do I question, but in that excellent Collection of Dr. *Woodward's*, and in those of some others of our curious Naturalists, several Species may be found that are not in mine: And yet I cannot understand that all our *British Seas* afford one Sort of this

*V. Lih.
Br. p. 15.

this Shell. The like may be said as to several other Kinds; particularly the *Sea-Stars*, of the broken *Radii* whereof we find no less a Variety: * And the *Echini*, as to the Prickles or *Radioli* of which, as well as to those of Sea-Stars, all Sorts of *Lapides Judaici* (as many Years since I hinted to you) must be referr'd; notwithstanding the excessive Thickness of some of them, and that they have that very rough or Grafer-like Superficies, so as to be no thing like the Spines of any of the *Echini*, or Star-Fish of our Seas.

* *ib. Claf.*
6. p. 44.

† *Vide*
Plot's
Hist. Nat.
Ox. 3
Lib. Br.
Tab. 12.
N. 1002,
1008, &c.

Tenthly, I add only one other Argument, which though many have already objected, yet hath not, that I know of, been hitherto answer'd to Satisfaction: And that is, that such Marine Substances are sometimes generated in Humane Bodies: For to me it appears a far less Wonder, that Shells and other Marine Bodies should be produc'd in the Bowels of the Earth, than their Production in the Bodies of Men or Animals at Land. And that they have been so found, is sufficiently attested, both by Ancient and Modern Authors, of a Credit and Character beyond all Exception. You know many Instances of this Kind are produced by Dr. *Lister*, in the Second Part of his Anatomy of Shells; amongst which I remember very well to have seen that small *Turben*, or *Periwinkle*, discovered by Dr.

‘ Dr. *Pierce* of *Bath*, and sent to Dr. *Musgrave*, then Secretary to the *Oxford* Philosophical Society ; and it was such, as I believe none could have possibly distinguish’d from a Sea-Shell. These, Sir, are the Objections I had to offer against their Opinion, who attribute the Origine of all these Marine Fossils to the universal Deluge : For whatever their true Origine is, *Marine Fossils* they ought to be term’d, in order to their better Distinction from all others. ’Tis also for the like Conveniency of Distinction, that I use the Term of *Mineral Plants* for those Fossil Leaves and Branches we find so commonly inclos’d in Stone and blue Marble at our Cole-pits, and some Iron Mines. And now to proceed to these, we shall find much the like Difficulties with what occur’d when we consider’d the *Marine Fossils*.

‘ *First*, For in the first place, these subterraneous Leaves frequently (indeed most commonly) are found at the Depth of at least twenty or thirty Foot. And how they should be laid so deep by an Inundation, seems to me not so easily accountable ; it being natural to suppose, that all Plants were left, by the Deluge, on the Surface of the Earth, in the manner we daily find several *America* Seeds of Leguminous Trees cast up on the Shores of *Ireland*, *Scotland*, and *Wales* ; and that consequently, in a short

‘ short Space, there would be no more Remains of them, than we find of those Sea Plants we commonly dung our Land with-
‘ all.

‘ *Secondly*, Allowing they might be, by some Accident we cannot think of, buried so deep, I can discover no Reason for their being thus lodg’d so plentifully in Cole-Slat, and Iron-Stone; and never, that I know of, in the Mass of our Flint, Limestone, and common Rock, though there be infinitely the greater Quantity of these latter. And this Note seems to deserve our Consideration, unless it can be made out, that though the Matter of Flint and Limestone has very entirely preserv’d the Antediluvian Shells, yet it could not Leaves, or other Parts of Vegetables.

‘ *Thirdly*, Had they been owing to the Deluge, we should find the Leaves and Branches of such Plants as are Natives of our own Island, much more plentifully than such unknown Plants as we cannot parallel: Whereas on the contrary, as far as Dr. *Richardson*’s Observations, and my own, have been able to distinguish, the Generality of these Mineral Leaves, are clearly distinct from those of our *British* Plants.

‘ *Fourthly*, Had they been thus repositied at the Deluge, some Specimens of most, if not of each Class of Plants, would be found
‘ amongst

amongst them; and especially of Trees, in regard such Leaves are not only the most numerous, but also commonly the dryest and most durable. But we have not hitherto discover'd, that any of these Mineral Leaves answer to those of Trees or Shrubs; nor are we assur'd that any have been yet found, but what may be reduced to three or four Classes.

Fifthly, The same curious and ingenious Gentleman hath observed, that these Mineral Leaves are, generally speaking, less than those they seem most to resemble; which is what, in divers Specimens, I have since taken Notice of myself.

Sixthly, Although sometimes meer flexible Leaves are found amongst these Mineral Plants, yet the Generality of them (as I have before observed of some of the Marine Fossils) are but meer Delineations, or superficial Resemblances: Nor yet could such Representations be owing to the Impressions of Plants, since consum'd; because, as I have said before of the *Mock-Fish*, they are a little raised above the Surface of the Stone, and not impress'd.

Seventhly, It seems nothing more strange or unaccountable, that Delineations of Leaves should be naturally produced in this Coal-Slat, &c. than that Representations of Gnats should be sometimes found in

in the Fossil Amber of *Prussia**, and of Spi-
ders in the Coal-Slat in *England*†. But
if any assert, that these were once living
Animals, they are to explain how they came
so deep under Ground; and afterwards,
how they got into these entirely close Pri-
sons of Stone and Amber. I meet with
several more Difficulties, but perhaps of
less Moment, which I shall not therefore
trouble you withall, till some other Occa-
sion.

* *Narva.*
Hist. Sney
cini-Pruss.
p. 85.
† *Lith.*
Brit. p.
111.

As to the other Opinion, which main-
tains, that all these Bodies are form'd in the
Earth; the greatest Difficulty it labours un-
der, is, that we find ourselves incapable of
giving any satisfactory Account of the Cau-
ses and Manner of such a Production. For
if any have Recourse, with Dr. Plot, to the
Plastick Power of Salts, I see not (to go no
farther) what they can answer to that Ob-
jection propos'd by yourself long since, in
your *Physico-Theological Discourses*. For
who can reasonably imagine, that any Mi-
neral Salts should so conspire, as that some
of them should so exactly frame the Points
of the *Glossopetra**, which are Fish-Teeth,
of one Matter, and some their Roots (ad-
ding now and then a Piece of a Jaw) which
are of another: That some should form
the polite Convex Side of a *Siliquastrum*,
and others its Appendix††: That some
should make the Scket or Calix of the

* *Lith.*
Brit.
Tab. 13.
N. 1270.

†† *Ibid.*
Tab. 16.
N. 1505.

B?

* *Ibid* *Belemnites*, and others its * *Alveolus*, &c.
 Tab. 21. I therefore humbly offer to your Confide-
 N. 1675, ration, some Conjectures I have of late Years
 & 1740. entertain'd concerning the Causes, Origine,
 & Schenck. and Use of these surprizing *Phænomena*. I
 Lish. Fel- have, in short, imagin'd they might be part-
 vet. Tab. ly owing to Fish-Spawn received into the
 1. Fig. ii. Chinks and other *Meatus's* of the Earth in
 the Water of the Deluge, and so be deriv'd
 (as the Water could make way) amongst
 the Shelves or Layers of Stone, Earth, &c.
 and have farther thought it worth our En-
 quiry, whether the Exhalations which are
 rais'd out of the Sea, and falling down in
 Rains, Fogs, &c. do water the Earth to
 the Depth here required, may not from the
Seminium, or Spawn of Marine Animals, be
 so far impregnated with, as to the naked
 Eye invisible, *animalcula*, (and also with
 separate or distinct Parts of them) as to
 produce these Marine Bodies, which have
 so much excited our Admiration, and in-
 deed baffled our Reasoning, throughout the
 Globe of the Earth †. I imagin'd farther,
 that the like Origine might be ascribed to
 the

† In those accurate Microscopical Observations commu-
 nicated to the Royal Society by Sir C. H. we find this Note:
 —Some of them also may probably be originally Water Insects, or
 Fish, sui generis, and are small enough to be rais'd in Substance or
 in Spawn with the Vapours, and again to fall with the Rain, and
 may grow and breed again in Water when kept: And this will seem
 less

the Mineral Leaves and Branches, seeing we find that they are for the most part the Leaves of Ferns, and other *Capillaries*; and of Mosses and such like Plants, as are called less perfect; whose Seeds may be easily allow'd to be wash'd down by the Rain into the Depth here required, seeing they are so minute, as not at all to be distinguish'd by the naked Eye. And as to such of them as are not reducible to these Classes of Minute Seeds, they are such as I know not at all whither to referr.

I AM not so fond of this *Hypothesis*, as not to be sensible myself, that it lies open to a great many Objections; and, in all probability, you will soon discover more Difficulties than I shall be able to remove. However, those Arguments that first led me to it, shall be here laid before you.

First, Because I observ'd, that of all these extraneous Figures or Representations dug out of the Earth, there is scarce one in a thousand but is reducible to such natural Bodies as expose their Seeds either to the open Air or the Water: Namely, Plants, Insects, or Fish. For (as I have

less strange to you, when I assure you that I have seen, and when I am so happy as to wait on you next, will shew Fishes, some as small as Cheese-Mites of different Sorts, very wonderfully made, which are of the crustaceous Kind, shell'd with many Joins, with very long Horns, fringed Tails, and have many Legs like Shrimps, &c.
Phil. Tran. for March and April, 1703. p. 1366.

before

before hinted) had the Spoils of the Deluge been entirely (or, for the most part) preserv'd to our Time, we might reasonably expect Plenty of the Skeletons, and of the Horns and Hoofs of Quadrupeds: And, why should not either entire or broken Skeletons of Birds, be found preserv'd likewise in the same manner and in the same places we find the Leaves of Plants? How happens it, at least, that we find none at all of their Pen-feathers, which should seem of a Constitution more durable, if once inclos'd in fine Stone, than that of Plants? I am not ignorant, that some very learned Writers, and those even eminent Naturalists, have inform'd us, that not only Bones of Land-Animals, have been frequently found inclos'd on all Sides in solid Stone, but likewise the Representations or Lineaments of Birds and Beasts, and of Men and their Parts: Nay, even that *Monks, Hermits, and Saints*, have been exactly pourtray'd in the midst of solid Marble. To these I must take leave to reply; *First*, That some of these Informations are manifestly erroneous; for that they tell us, that these Delineations appear'd upon polishing the Marbles; whereas all Figures naturally delineated within Stones, must, upon polishing these Stones, be defac'd. *Secondly*, When we discover any unknown Fossils, we are very subject

to

‘ to make wrong Comparisons ; assimila-
 ‘ ting many of them to the Parts of Land-
 ‘ Animals, which, indeed, ought to be re-
 ‘ duc’d to Sea-Shells, or other Marine Bo-
 ‘ dies ; as may be observ’d in those Stones,
 ‘ call’d *Hippocephaloides*, *Otites*, *Bucardites*,
 ‘ and divers others. *Thirdly*, Although it
 ‘ be granted, that sometimes the Bones,
 ‘ Horns, and Hoofs of viviparous Animals,
 ‘ are dug out of the Earth ; yet, seeing
 ‘ they are so very few, it seems much like-
 ‘ lier that they might have been bury’d by
 ‘ some other Accidents, than that they have
 ‘ been there preserv’d ever since the Deluge.
 ‘ For in the Deluge, all Land-Creatures
 ‘ whatever perish’d ; nor should we so much
 ‘ expect to find their single Bones as whole
 ‘ Skeletons, thus interr’d. *Fourthly*, When-
 ‘ ever I find any Confirmation, by competent
 ‘ and credible Authors, of such Delineations
 ‘ of any sort of viviparous Animals, or
 ‘ Birds, as the *Islebian* Stones exhibit of
 ‘ Fish, I shall then readily grant, these Things
 ‘ may be also as well produc’d without
 ‘ previous Seeds ; and offer no farther Ar-
 ‘ guments for this *Hypothesis*.

‘ *Secondly*, ‘ I am, as to my own part, a-
 ‘ bundantly satisfy’d ; and others will, I
 ‘ presume, upon Sight, and accurate Obser-
 ‘ vation of some Fossils I have collected, be
 ‘ no less, that these Bodies do, in Tract of
 ‘ Time, quite lose their Forms, and become
 ‘ such

such shapeless Lumps, as to be distinguish'd for Marine, by none but such as are very conversant in Observations of this Kind, nor even, at last, by them neither. I say, I am fully satisfy'd thereof; because I have collected sparry or crystalline Bodies, whose Surface do only partly resemble *Entrochi*; likewise Shells, *Glossopetra* and *Siliquastra*, consisting of a flinty sort of Pebble, and receding from their proper or common Figures. And, *Lastly*, *Ichthyspondylli*, or Fish-*Vertebra*; sometimes more, sometimes less, deform'd; exhibiting on their Surface, such small stellated Figures as we find on a sort of the

* v. Plot's
Hist.
Oxon.
p. 87. &
Lib. Brit.
Tab. 20.
Num.
1658.

* *Astroites*. Now seeing that, in Tract of Time, some of them lose their Substance and Form, degenerating into other Bodies, may we not suspect that others (considering the Intireness of many of them, and their vast Plenty) might be, in the interim, produc'd?

Thirdly, If this *Hypothesis* may be admitted, some Account might probably be given of the Fossil *Nautili*, and other strange Shells, by supposing, *First*, That many of those Clouds, which fall here in Rains, &c. have been exhal'd in very remote Parts: And, *Secondly*, That such a Generation, as is here suppos'd, must be much more liable to monstrous Productions than the common. For, as *Agri-*
cola

cola says, appositely to this Purpose, *Quantum* to *crassior est terra quam aqua, tanto imperfectiores gignit formas, & quae animalibus careant.*

Fourthly, ' I have often, in one and the same Quarry, gather'd 20 or 30 different Magnitudes of the same Species of Shell-Stones ; whence I began to suspect, that they might have a certain vegetative Growth † ; and that they had, therefore, their Generation and Corruption in the very Place we find them : And that hence it is, that we find some *Nautili*, *Lapides Judaici*, *Glossopetrae*, and *Astropodia*, of such monstrous Largeness, that no Seas, as far as our curious Naturalists have discover'd, afford any thing comparable to them.

† See the Works of the Learned for the Momb of Oa. 1703.

Fifthly, ' To comprize the rest in few Words: The burying of these Leaves of Plants so deep; the vast Quantity of these Marine Bodies; the incredible Variety of exotick or unknown Shells, Sea-Stars, &c. in so narrow a Compass as this Island; their so frequently distorted and uneven Surfaces; that they should be found at all Depths, from the Top of the highest Rocks to the Bottom; that they should be not rarely found adhering to the Roofs, and to the Walls, or Sides of Caves, as well as perpendicular Clefts of Rocks; and be also sometimes discover'd in Ani-

mal Bodies at Land; and that there should be Sea-Shells dug at Land containing living Animals. I say, all these considered together, seem inconsistent with the Effects of a Deluge; and if this *Hypothesis* may be admitted, not very difficult.

But before it be, I ought not to doubt, but that yourself and others will find many more Objections than I can foresee. In the mean time, such as occur to my Thoughts, I shall here, however destructive they may prove to it, fairly lay down; for they who have no other Aim than the Search of Truth, are no ways concern'd for the Honour of their Opinions: And for my part, I have been always, being led thereunto by your Example, so much the less Admirer of *Hypotheses*, as I have been a Lover of Natural History.

THE main Difficulties that I can at present think of, are these:

First, 'It will be question'd, whether the suppos'd *Seminium* can penetrate the Pores of Stones.

Secondly, 'It will scarce seem credible, that such Bodies, having no Life, should grow, especially when confined in so seemingly unnatural a Place as the Earth, &c.

Thirdly, 'According to this *Hypothesis*, these Bodies should be found in much the same manner, lodg'd in all kind of Stone, &c. and throughout all Countries.

Fourth-

Fourthly, ‘ We should not find Plenty of Shells, &c. adhering to each others, in the same manner as they are found at Sea.

Fifthly, ‘ Some Fossil Shells should then be found so minute, as to be scarce visible, and others of the same Kind in their complete Magnitude.

Sixthly, ‘ It may be well question’d, whether the essential Parts of this suppos’d Spawn of any Fish, should, being separated, (as must be here often suppos’d) ever effect the End by Nature designed them; especially when brought out of their proper Element.

Seventhly, ‘ It will be said, that the remaining Tracks of Shells that once adhered on the Surface of some of these Fossils, and the Pearls, which (as has been related) have been found sticking to others, are a plain Proof that they are the Spoils of once living Animals; also the Change of the Colour near the Roots of some Fossil Fish Teeth, as namely of some *Pectenites*, shew how far they were fasten’d in the Jaws of once living Fish; and that the worn Extremities of some others, do plainly discover that they have been once employ’d.

Eighthly, ‘ Many of these subterraneous Fish, as particularly several of the *Glossopetra*, are taken for the Teeth of Viviparous Fish; which being granted, it is impossible
O 3 they

‘ they should be produced in the Manner
‘ here proposed.

Ninthly, and *Lastly*, ‘ Such a Production
‘ seems clearly beside the ordinary Course
‘ of Nature ; nor can we perceive any End
‘ or Use of so preternatural a Generation.

‘ To the First I answer, That it’s mani-
‘ fest from Experience, upon which all solid
‘ Philosophy must be grounded, that the
‘ Spawn of Animals may insinuate itself in-
‘ to the Mass of Stone.

‘ AND this plainly appears from Live
‘ Toads, found sometimes in the midst of
‘ Stones at Land, and those Shell-Fish called
‘ *Pholades* at Sea. If it be replied, That the
‘ Stones, wherein the *Pholades* are lodg’d,
‘ are full of large Holes, &c. I answer, That
‘ tho’ they generally are so, yet, upon break-
‘ ing and examining a great many of these
‘ Stones, I have sometimes found of their
‘ Shells (though without Animals) so lodg’d,
‘ as that there were not any visible *Meatus*’s
‘ from their Holes, neither directly to the
‘ Surface of the Stones, nor to those other
‘ Holes in them. *

‘ To the Second, That that’s not so great
‘ a Wonder, as that Shells should be some-

* *Missum est ad me alio ex litore Saxum, in quo nulla rima,
nulla caverna, sed foramina tantum apparebant tam exigua, ut vix
aciem admitterent: Eo igitur illibus multis confraeto, cavitates
interne multe erant, vario situ & diversæ magnitudinis in quibus
vouchas istas reperi. Rondelæ Aquatilib.*

‘ times generated, and even grow, tho’ they
 ‘ contain no Animals within humane Bo-
 ‘ dies ; and within the Mass of those thick
 ‘ Shells of our large *Tenby* Oysters, which
 ‘ I formerly mentioned to you, as first shewn
 ‘ me by Mr. *William Cole* of *Bristol*, and have
 ‘ since observ’d myself. For we must grant,
 ‘ that the Earth, even in any Part of the In-
 ‘ land Country, is much fitter for their Re-
 ‘ ception and Augmentation than humane
 ‘ Bodies ; especially, if we reflect, that when
 ‘ the *Spat* or *Seminium* here suppos’d, meets
 ‘ with saline Moisture in the Earth, living
 ‘ Animals are sometimes produc’d, as is
 ‘ before attested.

‘ THE Third is likewise answer’d from
 ‘ Experience : For we know, that Sea-Shells,
 ‘ and some Stones, yield to the Growth of
 ‘ Plants : Also, that the hardest Stones are
 ‘ impress’d by the *Limpets*, tho’ they do but
 ‘ adhere to their Surface, and that our Lime-
 ‘ stone yields to the Growth of some *Echini*,
 ‘ or Sea-Urchins, as well as the *Pholades* :
 ‘ For, we find some of their Cells much less
 ‘ than others ; and that ’tis certain, that all
 ‘ the Holes wherein they lurk, in what Stones
 ‘ soever they are found, are owing to their
 ‘ Growth.

‘ TO the Fourth I answer, That this *Hypothesis* does not require, that these Marine
 ‘ Bodies should be produc’d in all Coun-
 ‘ tries alike. For, as in Vegetables, we find,
 ‘ that

Consequences of

‘ that all *Seeds* will not be receiv’d by all *Soils* ;
 ‘ so neither can we expect, that all *Earths* and
 ‘ *Minerals* should be equally proper for such
 ‘ *Productions*. And, truly, I thought it well
 ‘ worth *Observation*, that, as in all these
 ‘ *Countries*, scarce any *Stones* at *Land*, ex-
 ‘ cepting the *Lime-stone*, afford *Marine Fossils* ;
 ‘ so I never found the *Pholades* at *Sea* ;
 ‘ in any other, tho’ in that very common ;
 ‘ and in divers *Counties* of *Wales*.

‘ As to the *Fifth*, I pretend not to deter-
 ‘ mine, how long such *Bodies* may continue
 ‘ before their *Dissolution* ; but doubt not,
 ‘ but that, according to the *Nature* of the *Mi-*
 ‘ *nerals* wherein they are bedded, they may
 ‘ last much longer in some *Places* than o-
 ‘ thers ; and, therefore, we are not to won-
 ‘ der, if in such *Places* we find a far greater
 ‘ *Plenty* of them than elsewhere.

‘ To the *Sixth*, I answer, That at the *Bas-*
 ‘ *sy’s Leigh Quarry*, near *Oxford*, large *Spe-*
 ‘ *cimens* of the *Turbinites Major*, figured
 ‘ *Table the 7th, Numb. 341.* may be often
 ‘ met with ; and, likewise, in the same *Place*,
 ‘ concreted *Lumps* of others of the same
 ‘ *Species*, very minute. I have also, in my
 ‘ *Collection*, divers other *Examples* of the
 ‘ same *Kind* : And *Steno* informs us, That
 ‘ he has discover’d amongst *Fossils*, some so
 ‘ small, as to be scarce discernible without a
 ‘ *Microscope*, and even minute *Eggs* of
 ‘ *Shells*.

THE

‘ THE Seventh may be, in a great measure,
 ‘ answer’d from the numerous Histories we
 ‘ have of monstrous Productions : And,
 ‘ as to the Impropriety of the Place, the
 ‘ same may be answer’d here, in reference
 ‘ to Parts of Animals, as was to the Second
 ‘ Objection, in respect of Whole ones.

‘ EIGHTH, As to the Adhesion of one Shell
 ‘ to another, that may altogether as well
 ‘ happen by this Way of Generation as at
 ‘ Sea: And, for the Signs or Impressions
 ‘ made by some, that formerly adher’d to
 ‘ them, those might have been disjoin’d by
 ‘ the Workmen in digging, or by the Sink-
 ‘ ing of the Ground where they are found,
 ‘ or some other Accident. But, as to the
 ‘ Change of the Colour of the *Plectronites*,
 ‘ towards the Root, and some of them being
 ‘ sharpen’d at the Point, I must confess I
 ‘ have little to say ; but that we do not yet
 ‘ know, the Teeth of what Fish these *Ple-*
 ‘ *ctronites* are ; and, consequently, cannot tell,
 ‘ but they may be naturally so colour’d, and
 ‘ pointed : Or else, that these and many
 ‘ more have been thus preserv’d in the Place
 ‘ we find them, ever since the Deluge, which
 ‘ was formerly my Opinion of all these Ma-
 ‘ rine* Fossils ; though, for the Reason I have
 ‘ here given, I cannot now maintain it.

* Phil.
 Trans.
 for the
 Month
 of May,
 1693.

‘ NINTH, To the Ninth may be answer’d,
 ‘ That we have as yet but an imperfect
 ‘ Knowledge of the Generation of particular
 ‘ Species

Species of Fish. For whereas you have observ'd, that some of the Cartilaginous are viviparous, I have noted others to be oviparous; having observ'd Embryo's in the Eggs of a sort of Dog-Fish, (which were open at the one End) cast ashore in Anglesey, Carnarvonshire, and other Countries.

TENTH, As to the last, tho' we acknowledge that there is an End in all the Productions of Nature; yet it is no less certain, that we are often but very improper Judges of such Final Causes. Who, therefore, can be assur'd, but that the Fertility of the Earth may, in a great measure, be owing to these Marine Fossils? Thus much, at least, I have observ'd, that in *Wales* they are found, for the most part, in the best Countries, and that in vast Quantities: And on the other hand, in those *Hundreds* which are most barren, as the mountainous Parts of *Cardigan*, *Montgomery*, *Meirionydh*, and *Caernarvon*, I could never find one of them. There is, at *Cleydon-Field*, near *Banbury* in *Oxfordshire*, a Place call'd *Hore-Furlong*, which is noted for Plenty of the *Asteria*, or (as there call'd) * *Hore-stones*; and no less, as the Farmers assur'd me, for its Fertility. Moreover, we cannot be so positive, but that some Minerals may from hence derive their Origine, to say nothing of their Physical Use;

* Plot's
Hist.
Oxon.
p. 84.
G. Lib.
Brit.
p. 57.
112.

Ufe ; the *Lapis Judaicus* and *Lyncurius* having been long since well known in our Shops, as perhaps some others are elsewhere, and more may be hereafter. And these, Sir, are the Notions I had to offer to your Consideration, concerning the Origin of Marine Fossils and Mineral Leaves. You will soon judge how frivolous they may be, or how probable : And as you find them, pass your free Censure ; for 'tis the Truth of so important a Question that's the only Aim of,

S I R,

Raiadar Gwy,
Mar. 10. 1698.

Your Humble Servant,
E. L.

FOR my part, (if my Opinion be considerable) I think that my learned Friend hath sufficiently proved, that these Fossil-Shells were not brought in by the universal Deluge. He hath made it also highly probable, that they might be originally formed in the Places where they are now found by a spermatick Principle, in like Manner as he supposes. Why do I say probable ? It is necessary that at least those which are found in the *Viscera* and Glands of Animals, be thus formed ; and if these, why not those found in the Earth ? I shall say no more, but that those who are not satisfied with his Proofs, I wish they would but answer them. One thing, I confess, there is, which chiefly brought me
over

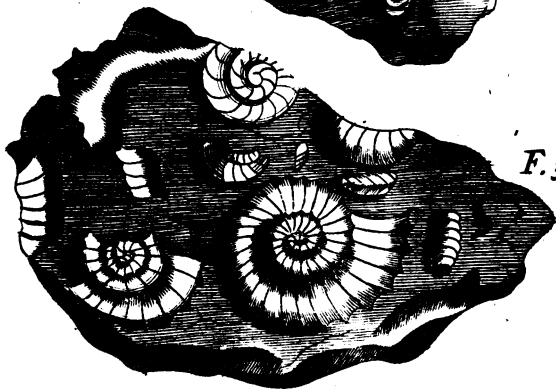
over to the contrary Opinion, viz. *That these Bodies owe their Original to the Sea, and were sometimes the Shells or Bones of Fishes*: That is, the Beds of Oyster-Shells found in several Parts of this Kingdom, some of which I have before-mention'd and describ'd; which Shells, all Circumstances considered, one can hardly be induced to believe to have been any other originally than the Covers of living Oysters, and the Places where they lie, than the Bottom of the Sea. But because this seems to infer the like Original of those Beds of *Cornua Ammonis*, or *Nautili*, found at *Keinsham* in *Somersetshire*, and elsewhere, of which Sort of Shell-Fish (as I have before noted) there were never any found in our own Seas, nor indeed in any other, so far as I have heard of, I shall allow them to have been the Effects of the like Principle with their Fellows.

THE following Tables, containing some Species of the most different *Genera* of these Bodies, viz. *Shark's Teeth*, *Wolf-Fish's Teeth*, *Cockles* or *Concha*, *Periwinkles* or *Turbens*, *Cornua Ammonis* or *Serpent-Stones*, *Sea-Urchins* and their *Prickles*, *Vertebres* and other *Bones of Fishes*, entire *Fishes petrify'd*, and of those some singly, some represented as they lie in Beds and Quarries under Ground, for the Information of those who are less acquainted with such Bodies, were thought fit to be added to this Edition.

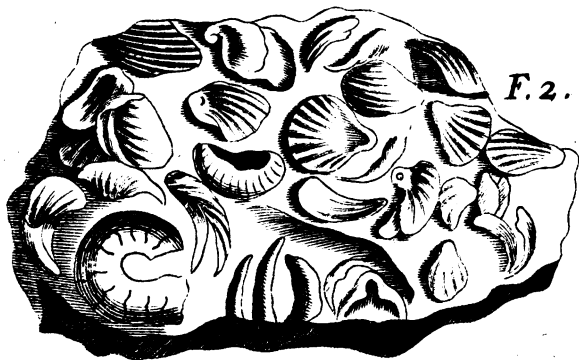
T A B.



F.1.



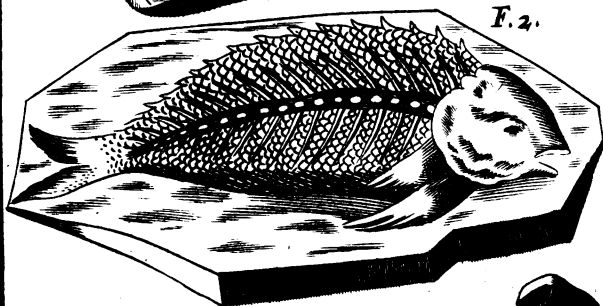
F.3.



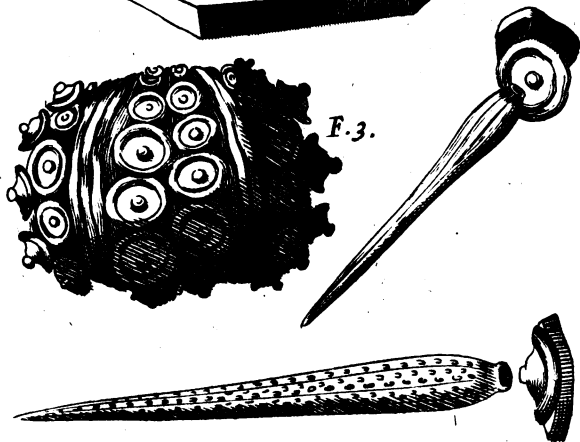
F.2.

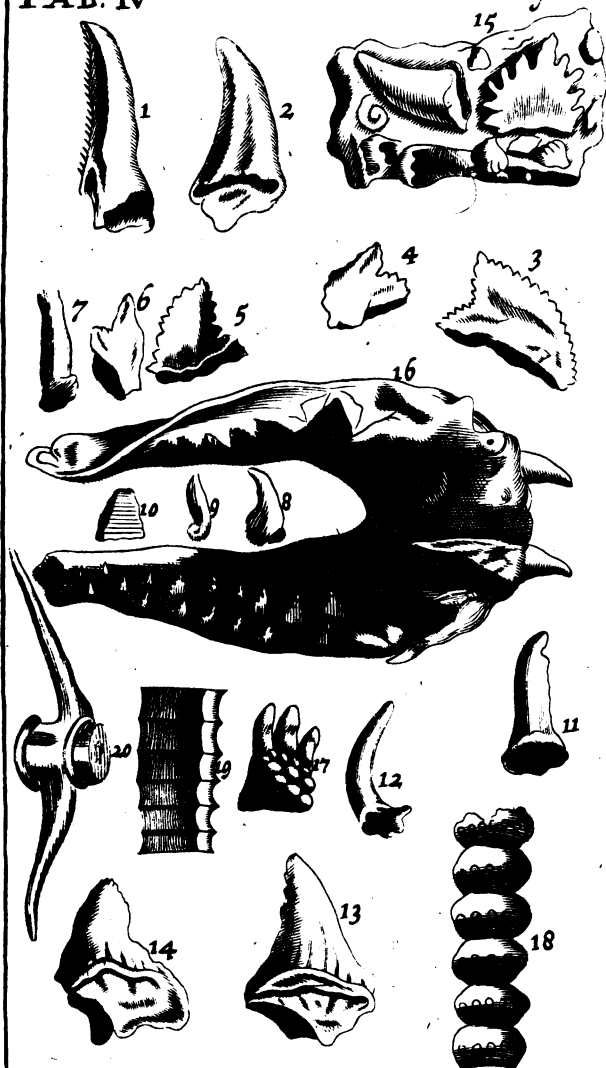


F.2.



F.3.





T A B. II. Pag. 204.

FIG. 1, 2. Several Fragments and Lumps of petrify'd Shells, as they lie in Quarries and Beds under Ground ; on many of these Petrifications there still remain some *Lamina*, or Plates of the Original Shells, which prove them not to be Stones primarily so figured.

Fig. 3. The *Cornea Ammonis* lying in Rocks with other petrify'd Bodies.

T A B. III. Pag. 204.

FIG. 1, 2. Two petrify'd Fishes lying in Stone, with their Scales and Bones.

Fig. 3. A Sea-Urchin petrify'd with its Prickles broken off, which are a Sort of *Lapis Judaicus*, or *Jew-Stones* ; their Insertions on the Studs or Protuberances of the Shell are here shewn. See their History and Manner of Lying in Stone and Beds, in *Agostino Scilla*, 4to. *Napoli*.

T A B. IV. Pag. 204.

FIG. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14. Several petrify'd Teeth of Dog-Fishes, Sharks, and other Fishes.

Fig. 15, 16. The same lying in a Tophaceous Bed, and also in a Jaw-Bone.

Fig. 17. The petrify'd Teeth of a Wolf-Fish, in a Piece of the Jaw ; the round ones, or Grinders, are sold in *Malta* for petrify'd Eyes of Serpents ; and by our Jewellers and Goldsmiths for Toad-stones, commonly put in Rings.

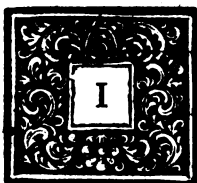
Fig. 18, 19, 20. Other petrify'd Bones of Fishes, especially Joints, or Vertebra's of Back-Bones, one with two stony Spines issuing out, f. 20. See them more at large in the Draughts of that curious *Sicilian Painter*, *Agostino Scilla*.

CHAP.



CHAP. V.

That there have been great Changes made in the Superficial Part of the Earth since the General Deluge, and by what Means.



SHALL now discourse a little concerning such Changes as have been made in the Superficial Part of the Earth since the universal Deluge, and of their Causes.

THAT there have been such, I think no sober and intelligent Person can deny, there being so good Authority and Reason to prove it. *Plato*, in his *Timæus*, tells us, That the *Egyptian* Priests related to *Solon* the *Athenian* Law-giver, who lived about 600 Years before our Saviour, that there was of old Time, without the Streights of *Gibraltar*, a vast Island, bigger than *Africa* and *Asia* together, called *Atlantis*, which was afterward by a violent Earthquake and mighty Flood, and Inundation of Water, in one Day and Night wholly overwhelmed and drown'd in the Sea. Whence it may be conjectured, that the Old and New World were at first continuous, or by the Intervention of that Island, not very far remote from each other.

THAT the Island of *Sicily* was of old broken off from *Italy* by the Irruption or Insinuation

ation of the Sea, is generally believed, and there is some Memorial thereof retained in the very Name of the City *Rhegium*, standing upon the *Fretum* that separates *Italy* and *Sicily*, which signifies breaking off.

----- * *Zancle quoque juncta fuisse* * *ovid.*
Dicitur Italiae, donec confinia pontus *Metam.*
Abstulit, & mediâ tellurem reppulit undâ. *lib. 15.*

In like manner, the Island call'd *Eubœa*, now *Negroponte*, was of old joined to *Greece*, and broken off by the Working of the Sea.

MOREOVER, the Inhabitants of *Ceylon* report, that their Island was anciently joined to the Main-Land of *India*, and separated from it by the Force of the Sea.

It is also thought, and there is good Ground for it, that the Island of *Sumatra* was anciently continuous with *Malacca*, and called the *Golden Chersonese*; for being beheld from afar, it seems to be united to *Malacca*.

AND to come nearer Home, *Verstegan* affirms, and not without good Reason, that our Island of *Great Britain*, was anciently Continent to *Gaule*, and so no Island but a *Peninsula*, and to have been broken off from the Continent, but by what Means, it is in his Judgment altogether uncertain: Whether by some great Earthquake, whereby the Sea first breaking through, might afterward by little and little enlarge her Passage; or whether

ther it were cut by the Labour of Man in regard of Commodity by that Passage ; or whether the Inhabitants of one Side, or the other, by Occasion of War, did cut it, thereby to be sequestred and freed from their Enemies.

HIS Arguments to prove that it was formerly united to *France*, are, 1. The Cliffs on either Side the *Sêa*, lying just opposite the one to the other ; that is, those of *Dover* to those lying between *Callais* and *Boulogne*, (for from *Dover* to *Callais* is not the nearest Land) being both of one Substance, that is, of Chalk and Flint. , 2. The Sides of both towards the Sea plainly appearing to have been broken off from some more of the same Stuff or Matter, that it hath sometime by Nature been fastned to. 3. The Length of the said Cliffs along the Sea-Shore being on one Side answerable in effect to the Length of the very like on the other Side, that is, about six Miles. And, 4. The Nearness of Land between *England* and *France* in that Place ; the Distance between both, as some skilful Sailors report, not exceeding 24 *English* Miles. To which may be added, 5. The Shallowness of the Channel all along the Streight, in respect of the Sea at both Ends of it, which is much deeper. And, 6. The Being of Wolves and Foxes, yea, and Bears too, anciently in this Island ; for it is not likely that they of themselves should venture to swim over a Channel 24 Miles broad ; or if they were

SOME of the Ancients, as *Strato*, quoted by *Strabo* in the First Book of his *Geography*, say, That the *Fretum Gaditanum*, or Streight of *Gibraltar*, was forcibly broken open by the Sea. The same they affirm of the *Thracian Bosphorus* and *Hellepont*, That the Rivers filling up the *Euxine* Sea, forced a Passage that way, where there was none before. And in Confirmation hereof, *Diodorus Siculus*, in his Fifth Book, gives us an ancient Story current among the *Samo-thracians*, viz. ‘ That before any other
‘ Floods recorded in Histories, there was a
‘ very great Deluge that overflowed a good
‘ Part of the Coast of *Asia*, and the lower

Grounds

Consequences of

‘ Grounds of their Island, when the *Euxine*
 ‘ Sea first brake open the *Thracian Bospho-*
 ‘ *rus* and *Hellepont*, and drowned all the
 ‘ adjacent Countries.

THIS Traditional Story I look upon as very considerable for its Antiquity and Probability, it seeming to contain something of Truth: For it's not unlikely that the *Euxine* Sea, being over-charged with Waters by extraordinary Floods, or driven with violent Storms of Wind, might make its Way through the *Bosphorus* and *Hellepont*. But it will be objected, that the *Euxine* Sea doth empty itself continually by the *Bosphorus* and *Hellepont* into the *Mediterranean*, and that if it had not this Way of Discharge (the Rivers bringing in more than is spent by Vapour) it would soon overflow all its Shores, and drown the circumjacent Countries; and so it must have done soon after the Flood; and therefore it is not probable that *Samo-thrace* should have been inhabited before that Irruption, if any such there were.

To which I answer, 1. That Monsieur *Marfilly* thinks he hath demonstrated an Under-Current in the *Thracian Bosphorus*, by means of which the *Euxine* may receive as much Water from the *Mediterranean* as it pours forth into it. But because I have already declared myself not to be satisfied of the Being and Possibility of these Under-Currents, I answer, 2. The Annual Receipts
 from

from the Rivers running into the *Euxine*, not very much exceeding what is spent in Vapour, who knows but that from the Time of the general Deluge, till the Irruption whereof we are discoursing, the *Euxine* might yearly enlarge its Basen, and encroach upon the Neighbouring Countries?

NATURAL Historians give us an Account of new Islands raised up in the Sea: *Plin. Hist. Nat. lib. 2. cap. 87.* enumerates *Delos* and *Rhodes*, Islands of Note; and of less Account and later Emerfion, *Anaphe* beyond *Melos*, and *Nea* between *Lemnos* and the *Hellefpont*: *Alone* between *Lebedos* and *Teos*, and among the *Cyclades*, *Thera* and *Tberafia*, *Olymp. 135. An. 4.* Among the same, after 130 Years, *Hiera*, and two Furlongs distant, in his own Time, when *Junius Syllanus*, and *L. Balbus* were Consuls, *Thia*. Notwithstanding these Authorities of *Seneca*, *Pliny*, and *Strabo*, before-mentioned, *Dr. Woodward*, in his *Natural History of the Earth*, confidently affirms, ' That there is no authentick Instance of ' any considerable Tract of Land that was ' thrown up from the Bottom of the Sea by ' an Earthquake, or other subterraneous Ex- ' plosion, so as to become an Island, and be ' render'd habitable. That *Rhodus*, *Thera*, ' *Tberafia*, and several other Islands, which ' were supposed by the Ancients, and upon ' their Authority by later Authors, to have ' been thus raised, had really no such Ori-
P 2 ginal,

ginal, but have stood out above Water as long as their Fellow-Islands, and stand now just as the universal Deluge left them.

I CANNOT but wonder at the Confidence of this Author, in affirming this of all Islands, not excepting any, whenas *Seneca*, a grave and sober Writer, and of undoubted Fidelity, tells us, *Natural. Quæst. lib. 6. cap. 21. Theram & Therasiam, & hanc nostræ ætatis insulam spectantibus nobis in Ægæo mari enatam: And this Island of our own Age, which was raised up in the Ægæan Sea, ourselves beholding it.* But the most considerable and remarkable Mutations that have been made in the Earth have been on the Sea-Coasts, either by carrying on the Land into the Sea, and atterrating the Bottom of the Sea; or by drowning the Lands near the Sea, by Irruptions and Inundations thereof, or undermining or washing away the Shores.

OF the first Sort of Change by Atterration, or making the Sea dry Land, we have an eminent Instance in the *Dutch Netherlands*, which, I easily consent with *Verstegan*, so far as they are eaven and plain without any Hills, have undoubtedly heretofore, in Time long past, been Sea; as appears, 1. From the Lowness of their Situation, some of the more Maritime Parts of them, as *Zealand* and *Holland*, and Part of *Flanders*, being so low, that by Breach or Cutting of the Sand Banks or Downs, which the Sea by little and little hath

hath cast up, and the Labour of Man here and there supplied, might easily be drowned and converted into Sea again; and of the great Harms that these Parts have heretofore, by the Irruption of the Sea, sustained. But now not only those low Places that adjoin upon the Sea, as *Holland* and *Zealand*, but the greater Part of *Flanders* and *Brabant*, though they lie not so low as they, but of such Height as no Inundation of the Sea can any whit annoy them, though the Sand-Banks and Downs on the Sea-Side were never so much broken or cut through, yet are they as even and level as even *Holland* and *Zealand* themselves, which is a sufficient Demonstration, that they were once covered with Water: For that Water will thus level Ground it often runs over, is clear from Meadows, and from the Bottom of the Sea discovered at low Water; and we have Experience of no other Cause that doth or can effect it. And therefore *Lewis Guicciardine* erroneously argues *Hubert Thomas*, Secretary to Count *Frederick*, Palatine of the *Rhine*, of a Mistake, for saying, in his Description of the Country of *Liege*, that the Sea hath come up even to *Tongres* Walls, now well nigh a hundred *English* Miles from the Sea: Among other good Reasons, alledging for the Proof thereof, that the great Iron Rings are there yet remaining, unto which the Ships that there sometimes arrived

ved were fastned. I say erroneously, seeing all the Countries between that and the Sea are level; and of an equal *Superficies*, without any Hills or Risings. 2. This appears, not only from the great Plainness and Evenness of the Ground, but in that the Soil generally, both in *Flanders* and *Brabant*, is sandy; whence it seems naturally to follow, that those Countries were anciently the Flats, Sands, or Shores of the Sea. 3. In that digging about two Fathom more or less deep in the Earth, innumerable Shells of Sea-Fish are found, and that commonly in all Places, both of Field and Town; and in many Places the great Bones of Fishes.

FARTHER (saith *Verstegan*) it is to be noted, that albeit digging deep in the Earth in *Brabant* and *Flanders*, great Abundance of Shells and Bones of Fishes are to be found; yet digging in the Earth in *Holland* and *Zeland*, none at all are perceived, howbeit on the Sands on the Sea-Shore there are very many. The Reason whereof may be, because those Parts have been in Time long past part of the Depth of the Sea; and the Parts aforesaid of *Brabant* and *Flanders*, the Flats or Shore; and on the Flats, and not in the Depths, such kind of Shell-Fish are naturally nourished. This is a very plausible Account. But yet it hath been by Experience found, that if you dig deep enough, even in *Holland* itself, after many Floors of several Sorts

of

of Earth, you will at last come to Beds of Shells. For *Varenius* tells us, that Sinking a Well in *Amsterdam*, after many Beds, or Layers of Earth, Sand, Turf, &c. at a hundred Foot Depth they came to a Bed of Sea-Sand mix'd with Cockle-Shells of four Foot Thickness, which doubtless was of old Time the Bottom of the Sea, and all the other Beds above it were brought down partly by Floods subsiding and settling there, partly by the Working of the Sea spreading Beds of Sand upon the Layers of the Earth, and so interchangeably. But from this Experiment it doth appear, that however deep the Sea were thereabouts, yet it was not too deep to breed or harbour Shell-Fish. Moreover, from this Instance it appears, that altho' now the Bottom of the Sea about *Holland* be not much below the Surface of the Land, yet anciently it was supposed fifty Foot; whence it will follow, that the Sea did then cover all the Land above *Holland*, which was not more than fifty Foot higher than it. This to me is a demonstrative Proof of the Atterration of the Sea thereabout.

ANOTHER great Instance of Change made in the *Superficies* of the Earth by Atterration is in our own Country, the great Level of the Fens running through *Holland* in *Lincolnshire*, the *Isle of Ely* in *Cambridgeshire*, and *Marishland* in *Norfolk*. Which that it was sometime part of the Sea, and atterra-

ted by Land brought down by Floods from the upper Grounds, seems to me evident, in that it is near the Sea, and in that there is thereabout a Concurrence of many great Rivers, which in Flood-times, by the Abundance of Mud and Silt they bring down, there subsiding, have by Degrees raised it up. And thirdly, in that the whole Country is exactly level, like the Bottom of the Sea; it being (as I have already said) the Nature of the Water flowing over the Earth in time to level and bring to a Plain all Places that are soft and yielding, and not rocky, as is seen in Meadows, and in the Bottom of the Sea discovered at low Water.

A THIRD Instance is the *Craux* in *Provence* in *France*, anciently called *Campus Lapideus*, of which *Pliny* saith it was *Herculis praeliorum memoria*; and *Strabo*, out of *Æschylus*, gives us a Poetical Fable, ‘ That the Stones were rained down by *Jupiter* in Favour of *Hercules* when he wanted Darts, that he might cast them at the *Ligurian Army*, and thereby break and scatter it.” *Possidonius* thinks it was once a Lake, which by Fluctuation dried up, and so the Stones came to be equally dispersed over the Bottom of it. That it was a very ancient thing, is clear, having its Original in the fabulous Times before any Memoirs of true History; it continues to this Day such a kind of Place as it was in *Strabo’s Time*. It appears so evidently

ly to any one who hath viewed and considered it, to have been once Part of the Sea, from its being exactly level, and strowed all over with Stones, as I have observed the Bottom of the Sea in many Places to be, that there is not the least Reason to doubt of it.

THE River *Arnus*, in *Tuscany*, now falleth into the Sea, six Miles below *Pisa*: Whereby it appeareth, (saith Dr. *Hakewil*) that the Land hath gained much upon the Sea in that Coast; for that *Strabo*, in his Time, reporteth, it was but twenty Furlongs (that is, but two Miles and an half) distant from the Sea.

I MIGHT, to these, add many other Instances of Atterrations out of *Strabo*, in his first Book; as about the Outlets of *Ister*, the Places called *Stetbe*, and the Deserts of *Scythia*: About those of *Phasis*, the Sea-coast of *Colchis*, which is sandy, and low, and soft: About *Thermodon* and *Iris*, all *Themiscyra*, the Plain of the *Amazons*, and the most part of *Sidene*.

To omit the whole Land of *Egypt*, which probably was covered originally with the Sea, and raised up by the Mud and Silt, brought down by the *Nile* in its annual Floods, subsiding there, as I shall have occasion to shew afterwards.

MOREOVER, *Varenius* rationally conjectures, that all *China*, or a great Part of it, was originally thus raised up and atterrated, having

having been anciently covered with the Sea : For that, that great and impetuous River, called the Yellow or Saffron River, coming out of *Tartary*, and very often, though not at anniversary Seasons, overflowing the Country of *China*, is said to contain in it so much Earth and Sand, as make up a third Part of its Waters. The Eavenness, and Level Superficies of this whole Country of *China*, render this Conjecture the more probable.

IN fine, the like Attractions appear to have been made about the Mouths of *Indus* and *Ganges* in the *East-Indies*, and the River *de la Plata* in *America*, and the *Rhodanus* in *France*, and, doubtless, most other great Rivers throughout the whole World.

To all which, if we add the spacious Plains that are on each side most great Rivers, from their Mouths, many Miles up their Channels, as may be observed in the *Thames* and *Trent* in *England*, which, probably, were at first *Sinus*'s of the Sea, landed up by Earth brought down from the Mountains and upper Grounds in Times of Floods ; it will appear, that in this respect there hath been a very great Change made in the terraqueous Globe, the dry Land much enlarged, and the Sea straitened and cut short.

NOTWITHSTANDING all these Authorities and Arguments, Dr. *Woodward*, in his *Natural History of the Earth*, confidently affirms, That there were never any Islands, or other
con-

considerable Parcels of Land amassed or heaped up, nor any Enlargement or Addition of Earth made to the Continent, by the Mud that is carried down into the Sea by Rivers. That although the Ancients were almost unanimously of Opinion, that those Parts, where *Egypt* now is, were formerly Sea, and that a very considerable Portion of the Country was recent, and formed out of the Mud discharged into the neighbouring Sea by the *Nile*, that yet this Tract of Land had no such Rise, but is as old, and of as long standing, as any upon the whole Continent of *Africa*, and hath been much in the same natural Condition that it is at this day, ever since the Time of the Deluge : Its Shores being not advanced one jot farther into the Sea for this Three or Four thousand Years, nor its Surface raised by additional Mud, deposited upon it by the yearly Inundations of the *Nile*. That neither the *Palus Maotis*, nor the *Euxine*, nor any other Seas, fill up, or by degrees grow shallower. That *Salmydessus*, *Themiscyra*, *Sidene*, and the adjacent Countries upon the Coasts of the *Euxine* Sea, were not formed out of the Mud brought down by the *Ister*, *Thermodon*, *Iris*, and the other Rivers, which discharge themselves into that Sea. That *Thessaly* was not raised by the Mud, borne down by the River *Peneus* ; the Islands *Echinades* or *Carzolari*,

Consequences of

‘ *zolari*, out of that brought by the River
 ‘ *Achelvas* ; *Celicia* by the River *Pyramus* ; *My-*
 ‘ *sia*, *Lydia*, *Ionian*, and other Countries of *Ana-*
 ‘ *tolia*, by the *Caycus*, *Hermes*, *Cayster*, and the
 ‘ other Rivers which pass through them. To
 ‘ be short, that no Country or Island in the
 ‘ whole World, was ever raised by this
 ‘ means.” Thus far Dr. *Woodward*.

ALL these Particulars he ought not only to have confidently asserted, but also sufficiently proved ; which till he can do, I must crave Leave to suspend my Assent.

FOR my part, I am of Opinion, that tho’ the Ancients might be mistaken in the full Latitude of what they have delivered, concerning the Atterration of the Skirts of the Sea in the Places forementioned, about the Outlets of great Rivers ; yet, that they had very good Reason for what they wrote :

First, The Nature of those great Levels being apt to suggest such a Thought to any considerate and unprejudiced Person.

Secondly, There being undeniable Instances of such Atterrations, though in less Quantities ; as, 1. That of *Ravenna* in *Italy*, which City anciently stood upon the Brink of the Sea-Shore, when it was the Head of an *Exarchate* ; whereas now, by the landing up of the Shallows, it is far distant from it. 2. That at the Mouth of the River *Arno* in *Tuscany*, just now mentioned. 3. That in the *Camarg* or Island which the River *Rhodanus* near *Arles*

Arles in *Provence* makes, where there hath been so much lately gained from the Sea, that the Watch-Tower had been, in the Memory of some Men living, when I was there [1665] removed forward three times, as I was there credibly informed.

MOREOVER, some Confirmation it is of this Opinion, that the Earth in the Levels, about the Mouths of great Rivers, is continually raised up higher and higher, which is done by the Mud and Silt brought down by the Rivers, especially in Times of Floods, and partly also by Sand and Ouze thrown up by the Sea ; which, by this means, contributes to its own straitening.

A RELATION of this Kind of Atterration, I find in the *Philosophical Transactions*. Numb. 277. pag. 1256. communicated by an innumerate Person to the learned and ingenious Mr. *Ralph Thoresby*, and by him to the *Royal Society*, in these Words :

‘ Near the River *Welland*, which runs
 ‘ through the Town of *Spalding* in *Lincoln-*
 ‘ *shire*, at the depth of about 8 or 10 Foot,
 ‘ there were found Jettys (as they call them)
 ‘ to keep up the old River-Bank, and the
 ‘ Head of a Tunnel that emptied the Land-
 ‘ Water into the old River : And, at a con-
 ‘ siderable Distance from the present River,
 ‘ I guess, about 20 or 30 Yards, there were
 ‘ dug up, about the like Depth, several old
 ‘ Boats : Which things shew, that anciently
 ‘ the

the River was much wider than now it is, or ran in another Place. On the other, viz. the North-West side of the River, and more upward, in the Town, were digged up (at about the forementioned Depth) the Remains of old Tan-Vats, or Pits, a great Quantity of Ox-horns, Shooe-Soles, and, I think, the very Tanners Knebs, &c." Which things shew, that the Surface of the Country lay anciently much lower than now it does.

One thing farther I will add, that lately, at the laying of the present new Sluice or Goat (as they call it) at the End of *Hamore-Beck*, as it falls into *Boston-Haven*; taking up the Foundation of the old Goat, they met with the Roots of Trees, many of them issuing from their several Boles or Trunks spread in the Ground; which, when they had taken up, (Roots and Earth they grew in) they met with a solid, gravelly, and strong Soil, of the high Country kind, which was certainly the Surface of the old Country; the certain Depth whereof I cannot tell you, but that it was much deeper than that at *Spalding*. What else could raise up this Ten Foot Thickness of Earth, but the Mud and Silt brought down by great Rivers, subsiding here? and partly, also, Sand and Gravel thrown up by the Sea, and deposited here in Spring-Tides?

A

A PARALLEL Instance of the raising up of the Earth, the learned Signor *Ramazzini* affords us in and about *Modena* in *Italy*.

IN the whole City of *Modena*, and round about for some Miles distance, in whatever Place they dig, when they come to the Depth of about 63 Foot, they pierce the Ground with a *Terebra*, about 5 Foot deeper, and then Water springs up with so great Force, that, in a moment, the Well is filled up to the Brim. This Water is perpetual, doth not increase by Rain, nor decrease by Draught." Of this Springing up of the Water about *Modena*, we have already made mention, and given an Account out of Signor *Cassini*. And what is yet more remarkable, from the Surface of the Ground to the Depth of 14 Foot, they meet with nothing but Rubbish and Ruins of an ancient City. Being come to that Depth, they find paved Streets, Artificers Shops, Floors of Houses, and several Pieces of Inlaid-Work. It's very hard to conceive, how the Ground of this City was raised thus; we can attribute it to nothing else, but that it hath been ruined, and then rebuilt upon its Ruins, since it's not higher, but rather lower still than all the adjacent Country.

AFTER these Ruins, they find a very solid Earth, which, one would think, had never been removed; but a little lower, they find it black, marshy, and full of Briars.

Signor

‘ Signor *Ramazzini* went down one of these
 ‘ Wells, and, at the Depth of 24 Foot, he
 ‘ found a Heap of Wheat entire: In another,
 ‘ of 26 Foot, he found Filberd-Trees with
 ‘ their Nuts. They find, likewise, every six
 ‘ Foot alternatively, a Change of Earth, some-
 ‘ times white, sometimes black, with Branches
 ‘ and Leaves of Trees of different Sorts. At
 ‘ the Depth of 28 Foot, or thereabout, they
 ‘ find a Chalk that cuts very easy. It is mixt
 ‘ with Shells of several sorts, and makes a
 ‘ Bed of about 11 Foot. After this, they find
 ‘ a Bed of marshy Earth, of about two Foot,
 ‘ mixt with Rushes, Leaves and Branches.
 ‘ After this Bed, comes another Chalk-Bed,
 ‘ of near the same Thickness with the for-
 ‘ mer, which ends at the Depth of 42 Foot.
 ‘ That is followed by another Bed of marshy
 ‘ Earth like the former. After which comes
 ‘ a new Chalk-Bed, but thinner, which hath
 ‘ also another marshy Bed underneath it.
 ‘ This ends at the Place which the Workmen
 ‘ pierce with their *Terebra*. The Bottom is
 ‘ sandy, mingled with a small Gravel, in
 ‘ which they find several Shells, such as are
 ‘ on the Sea-Shores. These successive Beds
 ‘ of marshy Earth and Chalk, are to be found
 ‘ in the same Order, in whatever Part of the
 ‘ Earth you dig. The *Terebra* sometimes
 ‘ finds great Trees, which give the Work-
 ‘ men much Trouble. They see also, at
 ‘ some times, at the Bottom of the Wells,
 ‘ great

' great Bones, Coal, Flints, and Pieces of Iron.

Ramazzini thinks, that before the Deluge, the Gulph of *Venice* reach'd as far as *Modena*, and beyond it; but that the Waters decreasing, the Earth was raised by the Slime and Sand which they left behind them; and that the Rivers and Brooks did, in process of Time, make the abovementioned Beds. Indeed, I cannot imagine what could make those Beds we find in Maritime Places, (as those we mentioned, which were found in sinking a Well at Amsterdam) and those we see in broken Mountains; but the Sediments of the Inundations of the Sea, or of Land-Floods.

To say, that the Earth about *Modena* is no higher now than when the Flood left it, seems to me a very unreasonable Assertion. For though we should grant, that the Earth was dissolved at the general Deluge, and that the different Parts thereof did subside, according to their different Gravities and Form, several Strata, or Beds; yet, how comes it to pass, that there should be so many alternate Beds of Chalk, and moorish Ground, one above another, in the Earth about *Modena*? And, how comes the Country round about to be as high as the present City, which is 14 Foot higher than the Streets of the City, upon whose Ruins it seems to have been built?

Q

N.B.

Consequences of

N. B. This Relation I transcribed out of the History of the *Works of the Learned*.

THAT the Rivers do bring down a great deal of Earth from the Mountains, upon Shots of Rain, is demonstratively proved by the lowering of the Mountains, because it can proceed from no other Cause imaginable. But that the Mountains are continually lowered or depressed, I shall hereafter, by two Instances, undeniably prove. And, the learned Jesuite *Josephus Blancenus* mentions the Lowering of Mountains, as a thing well known to the Mountaineers: For that, formerly, some intermediate Mountain intercepted the Sight of a Castle, or Tower, situate in a more remote Mountain, which, after many Years, the intermediate Mountain being depressed, came clearly into View.

I SHALL add hereto the Judgment of the most curious Observer of these things, *Nicolaus Steno*, in his *Prodromus*, &c. p. 106, 107. of the *English Translation*; *This is certain, (saith he) that a great Parcel of the Earth is every Year carried into the Sea, (as is obvious to him that shall consider the Largeness of the Rivers, and the long Passage through the Mid-land Countries, and the innumerable Number of Torrents; in a Word, all the Declivities of the Earth:)* And, consequently, *that the Earth, carried away by the Rivers, and joined to the Sea-Shores, does every day leave new Lands fit for new Inhabitants.*

BUT

BUT you will say, Hath there been no Compensation made for all this? Hath not the Sea elsewhere gained as much as it hath lost about the Mouths of the Rivers? If not, then the Sea will in time be so far landed up, or straitned, till it be compelled to return again, and overflow the whole Earth.

TO which I answer, That where the Shores are earthy, or argillaceous, or gravelly, or made of any crumbling and friable Matter, the Sea doth undermine and subvert them, and gain upon the Land; which I could prove by many Instances, some of which I shall afterward touch. But whether the Sea doth, in these Places, gain proportionably to what it loses in the forementioned, according to the vulgar Proverb, is to me somewhat questionable.

TO proceed now to discourse a little concerning the Changes that have been made by the Irruptions and Inundations of the Sea, or by its undermining and washing away the Shores.

THAT there have been of old great Floods, and much Land laid under Water by Inundations of the Sea, is clear, many such being recorded in History.

THE most ancient of all, next to the general Deluge in the Days of *Noah*, viz. that of *Ogyges* King of *Bæotia*, or rather *Attica*, seems to have been of this Nature: So doth that of a great Part of *Achaia* in *Peloponnesus*,

wherein the Cities of *Bura* and *Helice* were overwhelmed and laid under Water.

Cambden out of *Gyraldus* reports, ' That ' anciently a great Part of *Pembrokeshire* ran ' out, in the Form of a Promontory, towards ' *Ireland*; as appears by that Speech of King ' *William Rufus*, That he could easily, with ' his Ships, make a Bridge over the Sea, so ' that he might pass on foot from thence to ' *Ireland*." This Tract of Ground being all buried in deep Sands, during the Reign of King *Henry* the Second, was, by the violence of a mighty Storm, so far uncovered, that many Stumps of great Trees appeared fastned in the Earth: *Itusque securium tanquam besterni*, (saith *Gyraldus*) and the Strokes of the Axes in them, as if they had been cut but yesterday; *ut non littus jam, sed lucus esse videretur, mirandis rerum mutationibus!* So that now it made Shew of a Wood rather than of a Strand; such is the wonderful Change of all things!

HERE I might take occasion to discourse of subterraneous Woods and Fossil Trees, and not impertinently; because some have supposed them to have been thrown down by the universal Deluge; and to have lain buried in the Earth ever since, tho' erroneously. I shall, therefore, give a twofold Account of their Original: The *First*, From Inundations of the Sea, or the Force of violent and tempestuous Winds; The *Second*, By the Labour of Men,

Mén, who felled them down in the Places where they now lie.

First, By Inundations of the Sea. ‘Near Bruges, in Flanders, (as Boetius de Boot, who was Native of that City, relates) digging 10 or 20 Ells deep in the Earth, they find whole Woods of Trees, in which the Trunks, Boughs, and Leaves, do so exactly appear, that one may easily distinguish the several Kinds of them, and very plainly discern the Series of Leaves which have fallen yearly. These subterraneous Woods are found in those Places, which, 500 Years ago, were Sea, and afterwards either left or thrown up by the Sea, or gained from it; the Tides being kept off by Walls and Fences. But before the forementioned Term of 500 Years, there is no Memory that these Places were Part of the Continent. And yet, seeing the Tops of these Trees do, for the most part, lie Eastward, because, as it is probable, they were thrown down by the Easterly Winds, (which, on this Coast, are most boisterous and violent) it will necessarily follow, that in the most ancient Times, and before all Memory of Man, these Places were firm Land, and without the Limits of the Sea.” So far he. Afterwards, this Land, with the Trees upon it, being undermined and overwhelmed by the Violence of the Sea, the Land and Trees continued so long under

Q3

Water,

Water, till the Sea, either by its own Working, bringing up Sand and Stones, &c. or by Earth brought down by the Land-Floods, still subsiding to the Bottom, or by the Tide's being kept off by Walls and Fences, was filled up, and the Tops of the Trees covered; and so this Space again added to the firm Land.

ON the Coast of *Suffolk*, about *Dunewich*, the Sea hath, for many Years past, very much encroached upon the Land, undermining and overwhelming, by degrees, a great deal of high Ground, insomuch that ancient Writings make mention of a Wood a Mile and a half to the East of *Dunewich*; which is, at present, so far within the Sea. Now, if in succeeding Ages (as likely enough it is) the Sea shall, by degrees, be filled up by the Means beforementioned, and this Space be added again to the firm Land, these Trees will be found under Ground, in like manner as those about *Bruges* were.

I FIND, in a Letter from that learned and ingenious Naturalist, Dr. *Richardson*, registred in the *Philosophical Transactions*, Numb. 228. 'An Account of some subterraneous Trees, dug up at *Youle* in *Yorkshire*, about 12 Miles below *York*, upon the River *Humber*: Some are so large, that they are used for Timber in building Houses; which are said to be more durable than Oak itself; Others are cut into long Chips,

‘ Chips, and tied up in Bundles, and sent
 ‘ to the Market Towns several Miles off, to
 ‘ light Tobacco. Those that I have viewed,
 ‘ were all broken off from the Roots, I sup-
 ‘ pose, by Violence of Storm, or Water, or
 ‘ both; and, upon Enquiry, do find, that
 ‘ they are all after the same manner. They
 ‘ affirmed to me, that their Tops lay all
 ‘ one way, viz. with the Current of Wa-
 ‘ ter. So it seems, that these are of this first
 ‘ Kind, that were thrown down by Floods;
 ‘ and the Force of Water, and not cut down
 ‘ by the Hand of Man.

‘ UPON the first Sight of these (*saieth the*
 ‘ *Doctor*) I was induced to believe, that
 ‘ they are really Fir-Trees. The Bate or
 ‘ Texture of the Wood is the same with
 ‘ Fir, easily splitting. If burnt, it sends
 ‘ out the same resinous Smell; and it af-
 ‘ fords the same Coal. The Branches gene-
 ‘ rally grow in Circles, as the Knots do yet
 ‘ testify. The Knots do easily part from
 ‘ the Wood, as is usual in Fir-Wood.
 ‘ The Straitness and Length of these
 ‘ Trees, are also a Presumption that they
 ‘ must be such.”

IN the *Isle of Man* are also found of these
 subterraneous Trees, whereof we have an
 Account in a late Description of that Island.
 In a Bog of 6 Miles long, and 3 Miles over,
 called the *Curragh in Kirk-Christ Lezayre*,
 are Fir-Trees frequently found, which
 tho’

tho' they lie 18 or 20 Foot deep, yet their Roots are still growing upright in the Ground, and all firm and entire, but the Bodies broken off, with their Heads lying to the N. E.

THESE Trees (as it seems to me) were broken down, and prostrated by the Force of violent and tempestuous Winds, and the boggy Earth raised above them, in the manner we have before shewn. Hence the Head of them lie to the N. E. because the most violent Winds blow from the *Atlantick* Ocean which lies to the S. W. of this Island. The Manner of the Discovery of these Trees is very remarkable, since there are no Dews ever seen upon those Parts of the Surface of the Bog where they are found, though they lie 20 Foot interred.

Secondly, Some, and that the greatest Number of those subterraneous Trees, were burnt or cut down by the Labour of Man, in the Places where they now lie.

IN *England*, there are found of them in most of the great Morasses, Mosses, Fens, and Bogs, in *Somersetshire*, *Cheeshire*, *Lancashire*, *Westmorland*, *Yorkshire*, *Staffordshire*, *Lincolnshire*, and other Counties. The Wood of them is usually called Moss-Wood, and is black as Ebony.

THESE Trees, I say, were anciently burnt or cut down by the Labour of Man, as Mr. *De la Pryme* does clearly make out, in a Letter

Letter to Dr. *Sloane*, registred in the *Philosophical Transactions*, Numb. 275. ' In that many of these Trees have been burnt, some quite through, some all on one side, some have been found chopt and squared, some bored through, others half riven with great wooden Wedges and Stones in them, and broken Ax-Heads And it is very observable, that upon the Confines of the Low Country, between *Burningham* and *Brumley* in *Lincolnshire*, are several great Hills of loose Sand, which, as they are yearly worn, and blown away with the Wind, there are discovered under them many Roots of great Firs, with the Impresses of the Ax, as fresh upon them as if they had been cut down but a few Weeks, which I have several times, with Pleasure, taken notice of, as I rode that way."

You will ask, Who felled these Trees? and for what Reason did they fell them? Mr. *De la Pryme* tells us, and proves it by sufficient Authorities, ' That the Romans did it, to take away these Shelters from the Britans, and to secure their Conquests. For (*saiþ he*) the ancient Roman Writers and Historians frequently tell us, That when their Armies and Generals pursued the wild Britans, they always fled into the Fastnesses of miry Woods, and low watry Forests. *Cesar* himself confesses the same, and says, ' That *Cassibelane* and his Britans,

Britans, after their Defeat, passed the
 Thames, and fled into such low Morasses
 and Woods, that there was no possibility
 of following them. We find also, that the
 stout Nation of the *Silures* did the same,
 when they were set upon by *Ostorius* and
Agricola. The like did *Venutius*, King of
 the *Brigantes*. And *Herodian* plainly tells
 us, That it was the Custom of the wild
 Britans, to keep in the fenny Bogs, and
 thick marshy Woods; and when Oppor-
 tunity offered, to issue out, and fall upon
 the Romans; who were at length so
 plagued with them, that they were forced
 to issue out Orders for the destroying and
 cutting down all the Woods and Forests
 in Britain, especially all those that grew
 on low Grounds and Morasses. This
 Order was executed, and they were ac-
 cordingly cut down, as is evident in ma-
 ny Writers, who tell us, That when *Sue-*
tonius Paulinus conquered *Anglesey*, he cut
 down all the Woods there. *Galen* the
 Physician tells us, That the Romans kept
 their Soldiers continually employed in
 cutting down of Woods, draining Mar-
 shes and Fens, and in paving of Bogs. It
 is manifest also, they did not only do this
 themselves, but imposed the same heavy
 Task upon the Captive Britans. For
Galgæcus, in his Speech to his Soldiers,
 tells them, That the Romans made Slaves
 of

of them, and wore out their Bodies in cutting down of Woods, and in cleansing of Bogs, amidst a thousand Stripes and Indignities. But that which is most observable, is, what *Dion Cassius* tells us, viz. That the Emperor *Severus* lost 50000 of his Men, in a few Years time, in cutting down the Woods, and cleansing the Fens and Morasses of this Nation. Thus far *Mr. De la Pryme*; who adds much more of the famous Levels of *Hatfield Chace*, and the adjoining Countries, which may be seen in the Letter quoted before. Moreover, not only the *Romans* have taken this Course of cutting down the Woods, for the Reasons alledged, but other great Generals and Conquerors of Countries. So our *Henry II.* when he conquered *Ireland*, cut down all the Woods that grew upon the low Countries thereof, the better to secure his Conquest and Possession of the same, to keep the Country in a settled Peace, and to disarm the Enemy, who commonly trusting to such Advantages, are apt to rebell. For, safe Retreats are often observed not to make more Thieves than they do Rebels; as *Mr. De la Pryme* well writes. The like did *Edward I.* (as *Holinsbed* and other Historians tell us) when he conquered *Wales*; for being not able to get near the *Welsh* to fight them, by reason of their Skulking and Continuance in boggy Woods, he commanded them

them all to be destroyed, and cut down by the Fire and Ax.

THE like Original, no doubt, had those great Numbers of subterraneous Trees, which the Describer of *Amsterdam* tells us, are found and digged up in Mosses and Fenny Grounds, where they dig for Turves in *Friesland* and *Groningland*.

IF it be demanded, how these Trees came to be sunk so deep in the Mosses, I answer, partly by the Rotting of their smaller Branches and Leaves, partly by the Earth and Silt brought down by Rivers, especially in Times of Floods, subsiding and spreading itself over these Trees; partly by Rain-water precipitating a copious Sediment, for the Nourishment of Moss growing abundantly, with other Plants on the Morass, and shooting down innumerable Roots, and those amassed together to a great Depth; as we see in Turf-Pits, that which is the most firm Part of the Turfs, and holds them together, being these Roots. Indeed it seems to me, that the lower Part of the *Superficies* of the Moss is changed continually into Roots, and raises up the Moor.

IT may be objected, that the greatest Part of the Moss-Wood seems to have been Fir; but Fir-Trees are not Native of *England*. To which I answer, That this is a great Mistake. For that anciently there were a bundance of Firs growing, even in the great Level

Level about *Hatfield-Chace*, or in other the like Places, Mr. *De la Pryme* hath sufficiently proved, in a Letter to Dr. *Sloane*, register'd *Philosoph. Transact.* Numb. 277. And I myself have seen a Remnant of these Fir-Trees growing on a Hill near *Wareton*, a Village in *Staffordshire*, about 2 Miles distant from *Newport* in *Shropshire*.

So, I think, I have given a sufficient and satisfactory Account of all the *Phænomena* of these subterraneous or Fossil Trees, or on Moss-Wood.

SINCE the Writing of this, happening to read Part of the Learned Dr. *Leigh's* Natural History of *Cheshire*, *Lancashire*, and the Peak of *Derby*, I find that the Doctor adheres to the ancient Opinion concerning the Original of these Fossil-Trees, viz. That they were brought in by the general Deluge, and deposited in the Places where they now lie, and rejects that of Dr. *Plot*, which we embrace; That these Morasses were the Product of the Woods that grew upon them, which by Putrefaction of the Leaves, Rains and Dews, may (as we daily see) be converted into Bogs and Morasses; and that the Firs found there, were not brought thither by any Deluge, but were the Products of the Soil, and in Probability ruined by the Britans in Revenge to the Danes, the Pine being their Darling Tree.

THAT

THAT these Trees grew originally in the Places where they are now found, I am of Accord with Dr. Plot, but cannot agree with him that they were thrown down by the Britans for the Reason he alledges. I rather think them to have been prostrated and overwhelmed by the Force of the Waters in some Inundation of the Sea, (not in the universal Deluge in the Days of Noah) and afterwards the Sea by Degrees receding, to have been covered with the Sediment of the Waters, and their own Branches and Leaves, with Moss and other Plants rotting upon them. This Hypothesis answers Dr. Leigh's second and third Arguments against Dr. Plot's Opinion, viz. 2. That he had seen seven or eight Fir-Trees of a vast Thickness contiguous to each other, so that whosoever considers the Circumference of them, must necessarily conclude, they could not grow there in that Order, it being impossible there should be a Distance between each Tree for their ascending Boughs. 3. Under these are frequently found the Exuvia of Animals, as Shells and Bones of Fishes, &c. which could not come from any other Cause but a Deluge. If he had said, some particular Inundation of the Sea, I could easily have agreed with him. For that there have been such particular Inundations of the Sea is manifest from several Histories, and particularly that transcribed out of Cambden a little before, to which

which I referr the Reader. As to his Opinion, that Firs are not, nor ever were, Native of *England*, I have already said, that I think it a great Mistake; Mr. *De la Pryme* producing many Testimonies that they were, particularly in the great Levels about *Hatfield-Chace*, and in *Lincolnshire*, &c. For the Readers Satisfaction, I shall here relate his Words.

‘ BEING the other Day at *Hatfield*, I was
 ‘ told by several Gentlemen, that about 20
 ‘ Years ago died one *Sanderson* of that Town,
 ‘ aged near 80 Years, whose Father, much
 ‘ of the same Age, did frequently assure
 ‘ him, and other Gentlemen that were curious
 ‘ in the Matter, that he could very well
 ‘ remember many hundreds of great Fir-
 ‘ Trees, standing one here and another there,
 ‘ in a languishing decaying Condition, half
 ‘ as high as Houses, and some higher, whose
 ‘ Tops were all dead, yet their Boughs and
 ‘ Branches always green and flourishing,
 ‘ growing all of them in these Levels. And
 ‘ *John Hatfield*, of *Hatfield*, Esq; Counsellor
 ‘ at Law, who is not above 40 Years of
 ‘ Age, has by him a large Twig that his Father
 ‘ plucked off from the Sprout of a green
 ‘ and flourishing Shrub of Fir, that grew
 ‘ at the Root of one of the same Kind in
 ‘ these Commons. And an old Man of *Croul*
 ‘ tells me, that he has heard his Father say,
 ‘ that he could remember Multitudes of
 ‘ Shrubs

‘ Shrubs and small Fir-Trees growing here,
 ‘ while this Country was a Chace, and
 ‘ while the Vert was preserved before the
 ‘ Drainage. And lastly, in many old Char-
 ‘ ters that I have seen of the pious *Roger*
 ‘ *de Mowbray*, Lord of *Axholm*, who lived
 ‘ in the Year 1100, relating to *Hurst, Bel-*
 ‘ *wood, Ross, Santoft, &c.* that then all these
 ‘ Places were covered with a great old de-
 ‘ caying Forest or Wood, and not them on-
 ‘ ly, but also all that low Common between
 ‘ *Croul-Caussey*, and *Authrop* upon *Trent*.
 ‘ And tho’ there be not one Stick of any such
 ‘ thing now to be found, yet it is not only
 ‘ plainly manifest, that the same was true
 ‘ from the Roots there found, but also from
 ‘ the said Roots that most of the Trees that
 ‘ then grew there were Firs.” Thus far
 Mr. *De la Pryme*. To which, if we add
 what Dr. *Richardson* observed of the subter-
 raneous Trees found at *Youde* in *Yorkshire*,
 together with the Remnant of these Trees at
 this Day growing near *Wareton*, which we
 before-mentioned, all together make up a de-
 monstrative Proof that Fir-Trees were not
 only Native of *England*, but grew abun-
 dantly in the great Levels in many Coun-
 ties thereof.

As for the Authority of *Julius Caesar* to the contrary, I make little Account there-
 of.

FOR,

FOR, 1. It's likely he never march'd so far up the Country, as to come to the Levels in which these Fir-Woods grew.

2. HE denies the *Fagus* to this Island, whereas the Beech-Tree, which is most certainly by the Authority of all Botanists the true *Fagus* of the *Latins*, grows plentifully here in many Places; and not a distinct Sort of *Fagus*, as Dr. *Leigh* fancies, from no better Proof than the Epithet *Patula*, or Spreading, (which *Virgil* attributes to the *Fagus*) which our Beech is not. But by his Leave, I myself have seen Beech-Trees with Heads sufficiently spread, to denominate them *Patula*.

To conclude: It's a vain thing to dispute by Argument against clear Matter of Fact; or to go about to prove, that all these Fossil-Trees were brought in by the universal Deluge, when we have sufficient Testimony, that the greatest Part of them that are found with us were cut or burnt down by the Hand of Man; the very Stroaks of the Axes appearing in them, as if they had been fell'd but Yesterday. So I shall leave this Subject, and return from whence I have digressed.

IN the Time of King *Henry* the first of *England*, there happen'd a mighty Inundation in *Flanders*, whereby a great Part of the Country was irrecoverably lost, and many of the poor distressed People, being bereft of

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their

their Habitation, came into *England*, where the King, in Compassion of their Condition, and also, considering that they might be beneficial to his Subjects, by instructing them in the Art of Cloathing, first placed them about *Carlisle* in the North, and after removed them into *South-Wales*, where their Posterity hath ever since remained.

IN the Year 1446, there perished 10000 People by the Breaking in of the Sea at *Dordrecht* in *Holland*, and thereabouts; and about *Dullart* in *Friesland*, and in *Zealand*, above 100000 were lost, and two or three hundred Villages drowned, some of their Steeples and Towers, when the Tide is out, still appearing above Water.

Mr. *Carew* of *Antony*, in his *Survey of Cornwall*, affirmeth, That the Sea hath ravened from that Shire the whole County of *Lioness*. And that such a County there was, he very sufficiently proves by many strong Reasons. *Cambden*, in his *Britannia*, reports out of ancient Records, 'That upon the *Kentish* Coast, not far from *Thanet*, is a sandy dangerous Place (which the Inhabitants call *Goodwyns Sands*) where an Island (being the Patrimony of Earl *Goodwyn*) was swallowed up in the Year 1097.

BUT the greatest Change of this Kind that ever was made (if it be true) was the Submersion of the vast Island of *Atlantis*, whereof we have already spoken,

As

As for the Changes that have been made by undermining and washing away the Shores, they have been partly the diminishing of the Land, and partly the raising up of several Islands not far from the Shores. So the *Baltick Sea* hath invaded the Shores of *Pomerania*, and destroyed a famous Mart-Town, called *Vineta*. So the ancient Borough of *Donewich*, in *Suffolk*, is almost quite eaten away and ruined by the Encroachments of the Sea. And it is said, that the Ocean hath cut off twenty Miles from the North Part of the Island of *Ceylan* in *India*, so that it is much less at this Day than formerly it was. And many the like Examples there are. And for the Raising up of Islands near the Shore, very likely it is, that the Sea continually preying upon the Shore, and washing away abundance of Earth from thence, cannot carry it far to any great Distance from the Shores, but lets it fall by little and little in their Neighbourhood; which subsiding or settling continually for some Ages, at last the Heaps ascend up to the very *Superficies* of the Water, and become Islands. Hence, in the Middle of the Ocean, there are no Islands, or but a very few, because those Parts are too remote from the Shores for any Earth washed from thence to be carried thither; and if it were, yet the Sea thereabout is too deep to have any Heap raised in it so high: Besides, the Motions of the Water in

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those

those Depths, were there Earth enough, would overthrow any Heap before it could be advanced any thing near the Top. But all Islands in general, a very few excepted, are about the Shores, or not far from the Shores of the great Continents. Which Thing is especially to be remarked in all the great Heaps or Swarms of numerous Islands, they being all near to the Continents; those of the *Ægean Sea* to *Europe* and *Asia*; the *Hesperides* to *Africa*; and the *Maldivæ*, (which are thought to amount to eleven thousand) to *India*; only the *Flandricæ* or *Azores* seem to be situate in the Middle of the Ocean, between the *Old* and *New World*.

BESIDES these Changes about the Sea-Coasts, by the prevailing of the Land upon the Sea, in some Places, and the Sea upon the Land in others, the whole Continents seem to suffer a considerable Mutation by the Diminution, and Depression or Sinking of the Mountains, as I shall have Occasion to shew afterward in the Third Discourse.

Ælian, in his eighth Book, *cap. 11.* telleth us, That not only the Mountain *Ætna*, but *Parnassus* and *Olympus*, did appear to be less and less to such as sailed at Sea, the Height thereof sinking. Of this Lowering and Diminution of the Mountains, I shall not say much in this Place, but taking it for granted at present, only in brief intimate the Causes of it, assigned by that learned Mathematician

Josephus

Josephus Blancanus, which are partly Rain-Water, and partly Rivers, which by continual Fretting by little and little, wash away and eat out both the Tops and Sides and Feet of Mountains, and fill up the lower Places of the Valleys, making the one to encrease, and the other to decrease; whereby it appears (saith Dr. *Hakewil*) that what the Mountain loseth, the Valley gains; and consequently, that in the whole Globe of the Earth nothing is lost, but only removed from one Place to another; so that in Process of Time the highest Mountains may be humbled into Valleys: And again (which yet I will not allow him) the lowest Valleys exalted into Mountains. He proceeds; *Anaxagoras* (as *Diogenes Laertius* reports in his Life) being demanded what he thought, Whether the Mountains called *Lapsaceni* would in time be covered with Sea? answered, *Yes, unless Time itself fail*; which Answer of his seems to confirm the Opinion of *Blancanus De Mundi Fabrica*, cap. 4. where he maintains, That if the World should last long enough, by reason of this continual Decrease of the Mountains, and the Levelling of the Valleys, the Earth would again be overflowed with Waters, as at first it was.

BESIDE these more eminent and remarkable Changes, which in Process of time, after a long Succession of many Ages, threaten some great Effect; indeed, no less than a Re-

duction of the World to its primitive State before the Separation of the Land and Water ; there have been many other lesser Mutations made either by Earthquakes and Eructations of Burning Mountains, or by great Floods and Shots of Rain, or by violent or tempestuous Winds and Hurricanes, some whereof are mentioned by Naturalists and Historians, *Strabo*, *Pliny*, *Seneca*, *Ovid*, and others.

FOR Earthquakes, *Possidonius*, quoted by *Strabo*, in his first Book, writes, ' That there was a City in *Phœnicia*, situate above *Sidon*, swallowed up by an Earthquake, and that almost two Thirds of *Sidon* itself fell therein, though not suddenly, and all at once, so that there was no great Destruction or Slaughter of Men happened. The same extended almost over all *Syria*, tho' not violently, and reached as far as some of the *Cyclades* Islands, and *Eubœa*, where the Fountains of *Arethusa* in *Chalcis* were stopped up by it, and after many Days broke forth again at another Source ; neither did it cease to shake the Island by Parts, till the Earth opening in the Field *Lelantus* vomited out of a River of fiery Clay.

THE same *Strabo* tells us, ' That *Democles* mentions huge Earthquakes of old in *Lydia* and *Ionia*, extending as far as *Troas*, by which many Villages were swallowed up,

up, and *Sipylus* overthrown when *Tantalus* reigned, and great Lakes made of Fens.

AND that *Duris* saith, ' That the *Rbagades* Islands by *Media* were so called from the Lands about the *Caspia Porta* being torn and broken by Earthquakes, so that many Cities and Villages were overthrown, and several Rivers received Alterations.

AND *Demetrius Calatianus*, relating the Earthquakes that happen'd throughout *Greece*, writes, ' That a great Part of the *Lichades* Islands and *Ceneus* had been drowned thereby; and that the hot Baths at *Ædepsus*, and in *Thermophyle*, having been stop'd for three Days, flow'd again, and those of *Ædepsus* from new Sources. That the Wall of *Oreus* on the Sea-Side, and seven hundred Houses, were thrown down; and a great part of *Echinus* and *Heraclea Trachinia*; but the whole Building of *Phalarinus* was overturned from the very Soil or Plain of it; the like happened to the *Larians* and *Larissæans*; and that *Scarphia* was utterly demolished and subverted from the very Foundations, and not fewer than 1700 Persons overwhelmed and buried; and more than half that Number of the *Thronii*.

Pliny, in his first Book, cap. 84. tells us, ' That in the Reign of *Tiberius Cesar*, there happened an Earthquake (the greatest that ever was in the Memory of Man) wherein

‘ twelve Cities of *Asia* were prostrated in one Night.

BUT what is that to what *S. Augustine* writes, [*Lib. 2. De Miraculis SS. cap. 3.*] if that Book be his, ‘*In famoso quodam terræ-motu centum Libyæ Urbes corruisse: That in a famous Earthquake a hundred Cities of Libya were demolished.*

THE City of *Antioch*, where the Disciples of CHRIST were first called *Christians*, with a great part of *Asia* bordering upon it, was almost wholly subverted and swallowed up by an Earthquake in *Trajan's* time, as *Dion Cassius* writes; *Trajan* himself then wintering there.

THE same City of *Antioch*, in the Time of *Justinian*, in the Year of our LORD 528, was again shaken with a terrible Earthquake, wherein were overwhelmed and buried in the Ruins of the Houses above 40000 of the Citizens.

AND lastly, in the 61st Year after the last mentioned Earthquake, being again shaken by a new one, it lost 60000 of its Inhabitants: *Gregory*, the then Bishop, being by the Divine Favour, and in a manner miraculously preserved, the House wherein he abode falling down presently after his going out of it.

Eusebius and *Spartanus* make Mention of an Earthquake in the Emperor *Adrian's* Time, wherein *Nicomedia* and *Nicaea* of *Bithynia*,

thynia, and Nicopolis and Casarea, Cities of Palestina, were thrown down and ruined.

IN the Year 1182, when Saladin set himself to overthrow the Kingdom of Jerusalem, there happened an Earthquake, in which Antiochia, Laodicea, Alapia, Casarea, Emiffa, Tripolis, and other famous Cities, were almost wholly thrown down and destroyed.

To omit many that are recorded in ancient Histories, and to come near to our Times:

Æneas Sylvius, afterwards Pope by the Name of Pius the Second, in a Letter of his to the Emperor Frederick, thus pitifully describes an Earthquake that fell out in his time; *Audies ex latore presentium quàm mirabilia & incredibilia damna fecerit Terræ-motus in Regno Apuliæ, nam multa oppida funditus corruerunt, alia magnâ ex parte collapsa sunt. Neapoli omnes fere Ecclesiæ & maxima Palatia ceciderunt, plusquam triginta millia corpora oppressa ruinis traduntur, populus omnis habitat in Tentoriis, i.e. You shall understand by the Bearer of these Presents, what wonderful and incredible Losses an Earthquake hath wrought in the Kingdom of Apulia; for many Towns are utterly ruined, others for the greatest part fallen. In Naples, almost all their Churches and fair Palaces are overthrown; more than 30000 Persons are said to have been slain; all the Inhabitants dwell in Tents.*

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THIS Kingdom of *Naples*, especially *Apulia* and *Calabria*, hath, I think, been oftner shaken, and suffered more by Earthquakes than any other Part of *Europe*. For *Cluverius* tells us, That in the Year 1629, there were dreadful Earthquakes in *Apulia*, by which 17000 Men are said to have perished.

AND *Athanasius Kircher* the Jesuite, in the Preface to his *Mundus Subterraneus*, gives us a sad Narrative of a dismal Earthquake in *Calabria*, in the Year 1638, wherein himself was, and out of which he hardly escaped with his Life: Nothing to be seen in the whole Country he passed by for two hundred Miles in Length, but the Carcasses of Cities, and the horrible Ruins of Villages, the Inhabitants wandring about in the open Fields, being half dead with Fear and Expectation of what might follow. But most remarkable was the Subversion of the noted Town of *S. Eufamia*, which was quite lost out of their Sight, and absorpt, and instead thereof, nothing left but a stinking Lake. But for a full Account thereof, I referr the Reader to the said Preface.

NOT many Years ago, the famous City of *Ragusa* was almost wholly subverted and destroyed by a terrible Earthquake; and *Smyrna* has lately been demolished by one. From the *West-Indies* we hear frequently of great Damages done in our Plantations by Earthquakes. The printed Transactions and Journals

nals are full of these great Concussions and Subversions.

IN the Year 1692, on the Seventh Day of *June*, there happened a dreadful Earthquake in the Island of *Jamaica*, which made great Ruins and Devastations throughout the whole Country, but especially in the Capital Town of *Port-Royal*, which was almost swallow'd up and overflow'd by the Sinking of the Earth, and Irruption of the Sea: A full Account whereof contained in two Letters sent from the Minister of the Place, the one dated *June* the 22d, the other the 28th of the same Month, 1692, from A-board the *Granada* in *Port-Royal* Harbour, to a Friend of his in *England*, and published by Authority, I shall give the Reader, with some Remarks.

1. He tells us in general, That this Earthquake threw down almost all the Houses, Churches, Sugar-Works, Mills and Bridges throughout the whole Island: That it tore the Rocks and Mountains [others tell us, that it leveled some Mountains, and reduced them to Plains] that it destroy'd some whole Plantations, and threw them into the Sea; but that *Port-Royal* had much the greatest Share in this terrible Judgment.

2. THEN he acquaints us, what for to save the Reputation of the People, and to avoid the laying a perpetual Blot upon them, I should rather suppress and conceal, but for the

the Vindication of the Divine Providence and Justice, and to deterr others from the like Enormities, I think necessary to publish, That the Inhabitants of that Place were a most ungodly and debauched People, and so desperately wicked, that he was even afraid to continue among them; for that very Day this terrible Earthquake was, as soon as Night came on, a Company of lewd Rogues, whom they call Privateers, fell to Breaking open Warehouses and Houses deserted, to rob and rifle their Neighbours, whilst the Earth trembled under them, and some of the Houses fell upon them in the Act. [The like Robbers and Plunderers we were told wander'd up and down the Country, even in the very Smoke, during the last great Burning and Eruption of *Ætna* in *Sicily*.] And those audacious Whores that remained still upon the Place, were as impudent and drunken as ever; and that since the Earthquake, when he was on Shore to pray with the bruised and dying People, and to Christen Children, he met with too many Drunk and Swearing. And in his second Letter, he saith positively, That there was not a more ungodly People on the Face of the Earth.

3. THE Account he gives of the Motions and Effects of the Earthquake is as followeth: The Day when this Calamity befell, the Town and Island was very clear, affording not any Suspicion of the least Evil. [This is

is observed of most Earthquakes, and particularly of our last here in *England*, the Morning before it, being clear and calm.] But in the Space of three Minutes, about half an Hour after Eleven in the Morning, *Port-Royal*, the fairest Town in all the *English* Plantations, [and well might he call it so, if, as he writes in another Place of his Letter, most of the Houses upon the *Wharf* were built of Brick, and as fair as those in *Cheapside, London*] the best *Emporium* and Mart of this Part of the World, exceeding in Riches and abounding in all good Things, was shaken and shattered to Pieces, and covered for the greatest part by the Sea. The Wharf was entirely swallowed by the Sea, and two whole Streets beyond it. Himself, with the President of the Council, being in a House near where the Merchants meet, hearing the Church and Tower fall, ran to save themselves: He having lost the President, made toward *Morgan's* Fort, because being a wide open Place, he thought to be there securest from the falling Houses, but as he was going he saw the Earth open, and swallow up a Multitude of People, and the Sea mounting in upon them over the Fortifications: Moreover he tells us, That their large and famous Burying-Place, called the *Palisado's*, was destroyed by the Earthquake; and that the Sea washed away the Carcasses of those that were buried out of their Graves, their
Tombs

Tombs being dashed to Pieces by the Motion and Concussion. That the whole Harbour, one of the fairest and goodliest that ever he saw, was covered with the dead Bodies of People of all Conditions floating up and down without Burial. That in the Opening of the Earth, the Houses and Inhabitants sinking down together, some of these were driven up again by the Sea which arose in those Breaches, and wonderfully escaped: Some were swallowed up to the Neck, and then the Earth shut upon them, and squeezed them to Death; and in that Manner several were left buried with their Heads above Ground, only some Heads the Dogs have eaten, others are covered with Dust and Earth by the People which yet remain in the Place, to avoid the Stench. So that they conjecture, that by the Falling of the Houses, the Opening of the Earth, and the Inundation of the Waters, there are lost Fifteen hundred Persons, and many of good Note, as Attorney General *Musgrove*, Provost Marshal *Reeves*, Lord Secretary *Reeves*, &c.

FARTHER he tells us, That after he was escaped into a Ship, he could not sleep all Night for the Returns of the Earthquake almost every Hour, which made all the Guns in the Ship to jar and rattle. And he supposes that the whole Town of *Port-Royal* will in a short time be wholly swallowed by the Sea; for few of those Houses that yet stand
are

are left whole, and that they heard them fall every Day, and that the Sea daily 'encroached upon them. That they had Accounts from several Parts of those Islands of Mischiefs done by the Earthquake. From *St. Anne's* they heard of above 1000 Acres of Wood-Land changed into Sea, carrying with it whole Plantations. And, lastly, That he was told by some, that they still heard Belowings and Noises in the Mountains, which made them very apprehensive of an Eruption of Fire; which if so, he feared might be more destructive than the Earthquake. [But I think causlessly, for I never heard or read of any great Destruction of Men made by any Eruptions of Fire, even out of burning Mountains.]

4. THE Account he gives of his own unexpected and strange Preservation, take in his own Words: *After I had been at Church reading Prayers, (which I did every day since I was Rector of the Place, to keep up some Shew of Religion) and was gone to a Place hard by the Church, where the Merchants meet, and where the President of the Council was, who came into my Company, and engaged me to take a Glass of Wormwood Wine, as a Whet before Dinner; he being my very great Friend, I staid with him: Upon which he lighted a Pipe of Tobacco, which he was pretty long in taking; and not being willing to leave him before it was out, this detain'd me*

me from going to Dinner to one Captain Rudden's, whither I was invited: Whose House, upon the first Concussion, sunk first into the Earth, and then into the Sea, with his Wife and Family, and some that were come to dine with him. Had I been there, I had been lost. But to return to the President, and his Pipe of Tobacco: Before that was out, I found the Ground rolling and moving under my Feet; upon which, I said to him, Lord! Sir, what is this? He replied very composedly, being a very grave Man, It is an Earthquake; be not afraid, it will soon be over: But it increased, &c. Then he relates, how he went to his own Lodging, and found all things in Order there, nothing stirred out of its place; and, going into his Balcony to view the Street, he saw never a House down there, nor the Ground so much as crack'd: And that, after he had prayed with the People, at their earnest Request, and given them some serious Exhortations to Repentance, in which Exercises he spent near an hour and half, there came some Merchants of the Place to him, desiring him to go aboard some Ship in the Harbour, and refresh himself, telling him, that they had gotten a Boat to carry him off; whom he accompanied: And passing over the Tops of some Houses, which lay leveled with the Surface of the Water, got first into a Canoe, and

and then into a Long-Boat, which put him on board a Ship.

5. THE last thing I shall take notice of in these Letters, shall be the Influence and Effect this Judgment had upon the Remainder of the People, to bring them to a Sense of their Sins, and Repentance for them, and to resolve upon, and begin a Reformation and Amendment of their Lives. It is a true Saying, *Vexatio dat intellectum*: *In their Affliction they will seek me early.* The pious Inclination of the People appeared, in that they were so glad to see their Minister in the midst of this Disaster, and so earnest with him to come down and pray with them, when they saw him in the Balcony before-mentioned; and that when he came down into the Street, every one laid hold on his Cloaths, and embraced him, so that with their Fear and Kindness he was almost stifled. And that not only at the instant of the Distress, but afterwards when he went ashore to bury the Dead, and pray with the Sick, and baptize the Children, and preach among them, the People were overjoy'd to see him, and wept bitterly when he preached to them. Fear is a more powerful Passion than Love: And whatever creates Terror, is a more effectual Curb to restrain and rule Men as well as Children, than any Favours or Benefits, the most powerful Motives of Love and Affection: For though the Bonds

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of Love are called the *Cords of a Man*, and are indeed very strong ones to rational and ingenuous Persons, yet the greatest part of Mankind are so far degenerated, that *they have broken these Bonds, and cast these Cords from them*; and upon Trial, one shall find little of Gratitude or Ingenuity among them.

I SHALL add one or two Remarks upon the precedent Paper.

First, It is very remarkable, that the Day, when all this befell *Port-Royal* and the whole Island of *Jamaica*, was very clear, not affording the least Suspicion of any Evil; so that the Inhabitants had no Warning at all of it, but were surprized of a sudden, without time sufficient to escape and save themselves. For, in the short Space of three Minutes, the Town was shaken and shattered to pieces, and sunk into, and covered, for the greatest part, by the Sea. In which respect, this Judgment resembled those on the Old World and on *Sodom*, which, the Scripture tells us, were, to the People involved in them, sudden and unexpected; as also the Second Coming of CHRIST, and future Dissolution of the World by Fire, is predicted to be.

THAT the Cause of Earthquakes is the same with that of Thunder, I doubt not, and most learned Men are agreed; that is, Exhalations or Steams set on fire, the one in the Clouds, the other in the Caverns of the Earth; which

which is sufficiently proved from the great Deflagrations and Eruptions of *Vulcano's* or burning Mountains; they being always either preceded or attended by Earthquakes: And Earthquakes, even here in *England*, being, as far as I can understand, for the most part, accompanied with a Noise. But now of what Nature this Steam is, that is thus inflamed, and what causes the Accension, I must confess myself not to be yet fully satisfied. That it is at least partly Sulphureous is certain, and well proved by Dr. * *Lifter*, from the Sulphureous Stink of Waters smelt before, and of the very Air itself after them: That it conceives Fire of itself, and is not kindled after the Manner of Gun-powder by the Touch of Fire, is as clear, there being no Fire præexisting in the Clouds; but how it should kindle, unless by a Colluctation of Parts after the manner of Fermentations, I cannot conceive. And if so, then the Steam must be a dissimilar Body composed of Parts of different Natures; else would there be no Colluctation, and consequently no Accension, the Parts friendly conspiring and agreeing in the same Motion.

* *Philos. Transact.*
N. 157.

I AM not ignorant, that Water, either in the gross Body, or in Vapour, may and doth so far work upon some solid Bodies, as for Example, Quick-Lime, Hay in a Mow, the *Pyrites* or Fire-stone, &c. as to cause an Incalcescency, and even an Accension; but still

this is by the Discord or Contrariety of the Parts of Water or Vapour, and those of the forementioned Bodies meeting and struggling together. So in Tempests of Thunder and Lightning, the Fume contain'd in the Clouds, which my honoured Friend *Dr. Martin Lister* supposes and proves to be no other than the Breath of the *Pyrites* encountering with the Vapour of Water, there may very likely, by the Concourse and Conflict of these two, be produced first a great Heat, and afterwards an actual Fire.

As for Thunder, after the Steams inclosed in the Cloud are once inflamed, I conceive the Fire goes not out till the End of the Tempest; but when the inflamed Matter is so much dilated, that the Cavity of the Cloud cannot contain it, it rends the Cloud, and forces its Way through where it is most yielding, so much of the Fire escaping at the Breach, till the Cloud overcomes the Resistance of the Remainder, and closes itself again; and continues shut, till there be so much of the sulphureous Steam anew inflamed, as to have Strength enough to tear it, and break out the second time, which Process is repeated, till the whole Steam be burnt and consumed, and the Fire go out; or till the Cloud be quite condensed and fallen down in Rain. That this Vapour, or Steam in the Clouds, heats gradually before it comes to Accension, I think probable, because before
any

any considerable Tempest the Air beneath is sultry, (as we call it) that is, suffocatingly hot.

So likewise in the Caverns of the Earth, it is not unlikely that the Steams or Damps that cause Earthquakes before Ignition, may be gradually heated by a Colluctation of Parts ; but their Accension seems to be very sudden, and in manner of Explosion, like that of Gun-powder ; the Succussion coming unexpectedly without any Notice-giving, and being also very transient, and of short Continuance. I mean Earthquakes where there are no Eructations of Fire, such as ours in *England* are.

THERE is a Sort of Damp which some call a Fire-Damp or Fülminating-Damp, of which I had the first Notice from my honoured Friend *Francis Jessop Esq;* *An.* 1668. whereof I find a Relation since communicated by him in a Letter to *Dr. Lister*, published in the *Philosophical Transactions*, Num. 117. and a farther Account from him in Answer to some Queries proposed by the Honourable *Mr. Boyle*, in the *Philosophical Transactions*, Numb. 119. wherein he writes, That this Sort of Damp presently takes Fire at the Touch of a lighted Candle, or other flaming Matter, and flies out of the Mouth of the Bink or Shaft, with a Crack like a Gun. He instances in three Persons that had been hurt by it ; one in the Coal-Mines in Hasselberg Hills,
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who

who had his Arms and Legs broken, and his Body strangely distorted by it: A second in those at *Wingersworth*, who going into a Bink, where this Kind of Damp was, to fetch some of his Tools with a Candle in his Hand, found himself on a sudden environ'd with Flames, so that his Face, Hands, Hair, and a great part of his Cloaths were very much burnt. He heard very little Noise, but one who was working at the same time in another Bink, and those that were above Ground, heard a very great one, like a Clap of Thunder, wherewith the Earth shook; which hearing, they ran in a great Amazement to see what the Matter was, with their Candles in their Hands, which were twice extinguish'd, but held upon the third Lighting. They saw nothing, but met with an intolerable Stench of Brimstone, and a Heat as scalding as an Oven half heated, which made them glad speedily to quit the Place: A third at the same Place met with the same Accident: And the fore-mentioned Person happening then to stand at the Mouth of the fired Bink, was shot forth about two or three Yards, and had his Head broken and Body bruised against the farther Side; the same also a third time incurred the like Disaster. That it shot off the Turn at the Mouth of the Pit to a considerable Height: That they could perceive no Smell before the Fire, but afterwards a very strong one of Brimstone. That the
Damp

Damp hung about the Top of the Bink, and therefore they were forc'd to go with their Candles very low, else it would have taken Fire. That the Flame would continue in the Vault two or three Minutes, sometimes more after the Crack. That he could never hear of any Damps that kindled of themselves. That from the Breaking of these Fulminating-Damps proceeded, a black Smoak of the Smell and Colour of that from Gun-powder fired.

THIS Sort of Fire-Damp, Mr. *Beaumont* tells us, they have also in some Coal-Works bordering on *Mendip Hills*. See *Philosoph. Collect.* 1. And Mr. *George Sinclair*, in a Land called *Werdy*, West of *Leith*, which even in the Day-time is sometimes seen in Coal-works in little Holes, shining like kindled Sulphur. But the most strange Fire-Damp was that which happen'd at *Mostyn* in *Flintshire*, at the same time with that at *Wingersworth* [1675.] which as soon as the Colliers were scanted of Air, appeared in the Crevisses or Slits of the Coal, where Water had been before, in a small bluish Flame, flashing and darting like Sword-Blades from Side to Side of the Pit; and being kindled, had the same and more violent Effects than those of *Hasselberg* or *Wingersworth*, leaving a foul ill-scented Smoak behind it. In the last there mention'd (*Philosoph. Transact.* Numb. 136.) firing of it by one who ran indiscreetly with his Candle

over the Eye of the damp Pit, it flew to and fro over all the Hollows of the Work with a great Wind and mighty Roaring, tore the Mens Cloaths from their Backs, finding and burning them, as also their Hair and Skins, carrying some of them 15 or 16 Yards from their first Station, beating them against the Roof of the Coal and the Posts. As it drew up to the Day-Pit, it caught one that was next the Eye along with it, and up it comes and was discharged out of the Mouth of the Shaft with a terrible Crack, not unlike, but more shrill than a Cannon, so that it was heard fifteen Miles off. The Man's Body, and other things from the Pit, were seen in the Air above the Tops of the highest Trees that grew on the Brow of the Hill (eighteen Yards above the Pit) more than 100 Yards. The Barrel of an Horse Engine for winding up the Rope of above 1000 Pound Weight, though fasten'd to the Frame with Locks and Bolts of Iron, together with the Buckets and Rope were thrown up, and carried a good way from the Pit, and Pieces torn off from it scattered about the Woods. And lastly, the whole Frame of the Engine moved out of its Place. The whole Relation deserves well to be read.

THAT which seems to me most strange and Romantick, is the Motion of the Damp, that as if it had been a living thing, it should fly up with a long sharp Flame to lighted Candles

dles set over the Eye of the Pit; and put them out. And yet Mr. *Jessop* also mentions a like Motion in that of *Wingersworth*; For if, says he, in the *Bink* where it was, they held their Candles any higher than ordinary, they could see the Damp, which lay near the Roof, to descend like a black Mist, and catch hold of the Flame, lengthening it to two or three Handfuls.

By these Descriptions, this Damp should seem to be but Gun-powder in a Vapour, and to partake the Sulphur, Nitre, and *Bitumen*, as the learned Dr. *Plot* well proves in his *Natural History of Staffordshire*, c. 3. sect. 47. to which I refer the Reader. But for the Accension of it, whether it ever takes Fire of itself, I am in some Doubt. Mr. *Jessop* denies it of those of *Hasleberg* and *Wingersworth*; and how far those Relators that affirm it are to be credited, I know not.

If in this Particular I were satisfied, I should readily accord with the Doctor, That our Earthquakes in *England*, and any others that have but one single Pulse, owe there Original to the Kindling and Explosion of Fire-Damps.

You will say, That Fire is the Cause of Thunder we readily grant, because we see it plentifully discharged out of the Clouds; but what Reason have we to think so of this Sort of Earthquakes, where we see no Lightning or Eruption of Fire at all? What becomes of the inclosed Flame?

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IN Answer hereto, I demand, What becomes of it in the open Air? It diffuses itself through the Caverns of the Earth, till the Deflagration be made, and is there dissipated and dissolved into Fume and Ashes. It breaks not forth, I conceive, because by reason of the Depth of the Caverns wherein it is lodged, it is not able to overcome the Resistance of the incumbent Earth, but is forced *quà data porta ruere*, to make its Way where it finds easiest Passage through the strait *Cuniculi* of the Earth: As in a Gun the inflamed Powder, though if it were at Liberty, and found equal Resistance on every Side, it would spread equally every Way; yet by reason of the Strength and Firmness of the Metal, it cannot tear the Barrel in Pieces, and so break out; but is compelled to fly out at the Muzzle, where it finds an open, tho' strait Passage. For the Force of Flame, though very great, is not infinite.

It may be farther objected, We hear not of any Eruption of Fire at *Port-Royal*, or elsewhere in this Island, and yet the Earth opened, and the Roofs of the Caverns fell in, therefore Fire could not be the Cause of this Earthquake; for if it had, at those Apertures and Rifts of the Ground, it must needs have issu'd forth and appear'd abroad.

To which I answer, that the Vaults and Cavities wherein the inflamed Matter was imprison'd, and the Explosion made, lay deep
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in the Earth, and were cover'd with a thick and impenetrable Coat of hard Stone, or other solid Matter which the Fire could not tear; but that above this Coat there were other superficial Hollows in a more loose and crumbling Earth, which being not able to sustain the Shock, and hold out against the impetuous Agitations of the Earthquake, the Roofs might yield, open, and subside, as we hear they did, and give Way to the Sea to rush in and surmount them.

You will reply, This may be a tolerable Account of our *English* Earthquakes, which are finished at one Explosion, but what shall we say to those of *Jamaica*, which like a Tempest of Thunder and Lightning in the Clouds, have (as we learn by this Relation) several Paroxysms or Explosions, and yet no Discharging of Fire?

To which I answer, That I conceive the Caverns of the Earth wherein the inflamed Damps are contained, are much larger there than ours in *England*; and the Force of the Fire, joined with the Elatery of the Air, being exceeding great, may of a sudden heave up the Earth, yet not so far as to rend it in sunder, and make its Way out, but is forced to seek Passage where it finds least Resistance through the lateral *Cuniculi*. So the main Cavern being in a great Measure emptied, and the Exterior Parts of the extended Matter within cooling and shrinking, the Earth
may

Consequences of

may subside again, and reduce the Cavern to its former Dimensions. Yet possibly there may not be a perfect Deflagration and Extinction of the Fire, and so new Damps ascending out of the Earth, and by Degrees filling the Cavern, there may succeed a second Inflammation and Explosion, and so a third and fourth till the Steams be quite burnt up and consumed. But in this, I confess, I do not satisfy myself. They who have a more comprehensive Knowledge of all the *Phænomena*, may give a better Account,

BUT as for those Earthquakes that are occasion'd by the Burning of *Vulcano's*, they are, I conceive, of a different Nature. For in them the Fire burns continually, and is never totally extinct, only after the great Eruptions, in which, besides Smoak and Fire, there is an Ejection of abundance of Ashes, Sand, Earth, Stones, and in some Floods of melted Materials, the Raging is for a time qualified; but the Fire still continuing, and by Degrees increasing in the combustible Matter it finds in the Hollows of the Mountains, at last swells to that Excess, that it melts down Metals and Minerals where it meets with them, causing them to boil with great Fury, and extending itself beyond the Dimensions of the Cavities wherein it is contained, causes great Succussions and Tremblings of the Earth, and huge Eruptions of Smoak, and casts out such Quantities of
Ashes,

Ashes, Sand, and Stones, as we just now mention'd; and after much Thunder and Roaring by the Allision and Repercussion of the Flame against and from the Sides of the Caverns, and the Ebullition and Volutation of the melted Materials, it forces out that boiling Matter either at the old Mouths, or at new ones, which it opens where the incumbent Earth is more thin and yielding. And if any Water enters those Caverns, it mightily encreaseth the Raging of the Mountain. For the Fire suddenly dissolving the Water into Vapour, expands it to a vast Dimension, and by the Help thereof throws up Earth, Sand, Stones, and whatever it meets with. How great the Force of Water converted into Vapour is, I have sometimes experimented by inadvertently casting a Bullet in a wet Mold, the melted Lead being no sooner poured in, but it was cast out again with Violence by the Particles of Water adhering to the Mold, suddenly converted into Vapour by the Heat of the Metal.

Secondly, The People of this Plantation being generally so ungodly and debauched in their Lives, this Earthquake may well be esteemed by this Gentleman, the Minister of *Port-Royal*, a Judgment of God upon them.

For tho' it may be a senile Complaint, and popular Mistake, that the former Times were better than these, and that the World doth

doth daily degenerate, and grow worſe and worſe. *Ætas parentum peior avis tulit hoſ nequiores, mox daturos Progeniem vitioſiorem.* For had this been true, Vice would long before this Time have come to the Height and greateſt poſſible Exceſs; and this Complaint hath been made as well in the beſt as worſt of Times. Though, I ſay, this be partly an Error, yet I do verily believe, that there are certain Times when Iniquity doth abound, and Wickedneſs overflow in a Nation or City; and that long Peace and Proſperity, and great Riches, are apt to create Pride and Luxury, and introduce a general Corruption of Manners: And that at ſuch Times God uſually ſends ſome ſweeping Judgment, either utterly deſtroying ſuch a People who have filled up the Meaſure of their Iniquity, or at leaſt grievouſly afflicts and dimin iſhes them. So when in the old World the *Wickedneſs of Man was great upon the Earth, and every I-magination of the Thoughts of his Heart was only Evil continually*, Gen. vi. 5. *And the Earth was corrupt before God, and filled with Violence, all Fleſh having corrupted their Ways*, verſ. 11, and 12. God brought in the Flood, and drowned them all. The like Vengeance we find executed on the Cities of *Sodom and Gomorrha*, after ſuch a monſtrous Height of Wickedneſs as the Inhabitants were generally arrived at. And we ſhall find it noted by Hiſtorians, That before any great publick

publick Calamity, or utter Excision of a Nation, the People were become universally vicious and corrupt in their Manners, and without all Fear of GOD, or Sense of Goodness. For GOD doth not stand by as an idle and unconcerned Spectator, and suffer Things to run at Random, but his Providence many times interposes, and stops the usual Course and Current of Natural Causes: Nay, I believe and affirm, That in all great and notable Revolutions and Mutations, He hath the greatest Hand and Interest; Himself ordering and governing them by His special Superintendence and Influence. So, though the Instruments and Materials wherewith this Devastation in *Jamaica* was made, as a subterraneous Fire and inflamable Materials, were before in the Earth, yet that they should at this time break forth and work, when there was such an Inundation of Wickedness there, and particularly and especially at *Port-Royal*, this we may confidently say, was the Finger of GOD, and effected perchance by the Ministry of an Angel.

MOREOVER, this Relator's being called aside, and stopped from going to a Place, whether if he had then gone he had certainly perished, we have good Reason to think an Effect of Providence, designing thereby his Preservation; as *Gregory* the Bishop of *Antioch* his going out of the House wherein he abode immediately before it fell down, was

was rationally thought to be in respect of him.

BUT to proceed ; I should now have done concerning Earthquakes, it being my design only to take notice of such as have made considerable Mutations in the superficial Part of the Earth, passing by those, which after a short Trembling and Succussion, have left the Earth as they found it, making no Alteration at all therein. But at the very time this Sheet of Earthquakes was Composing, there happening a notable one, though of this latter Kind, in our own Country ; I was, partly by the Coincidence of it with the Composure before-mentioned, partly at the Request of the Bookseller, induced to make some Mention of it, and add what I knew or could learn of its History ; which is, indeed, very little and inconsiderable, we having as yet but a very lame and imperfect Account of the Accidents of it.

As for the Time when it happened, it was the 8th of *September*, 1692. about 4 Minutes past Two of the Clock in the Afternoon, as was observed at *London*: Hereabouts I can hear of no body that was so critical in noting the Time, only they agree that it was about Two of the Clock. Had we a punctual and exact Notice of the very Minute that it happened in far distant Places, we might thence gather something concerning the Motion and Progress of it. However, it is remarkable,

markable, that it happened in the *Autumn*, one of the Seasons, in which, *Aristotle* tells us, such Effects are most frequent, the other being the Spring ; and likewise in the Month of *September* ; in the which, that about *Oxford* in the Year 1683. fell out ; and, moreover, in a wet Season, as that also did : Though the Forenoon of the Day was clear and fair, yet, in the Afternoon, when the Earthquake was past, it rained hard till Night ; the whole precedent Summer (to this I mean) having been cold and wet : Which, what Influence it can have toward the Production of an Earthquake, unless by stopping the Pores of the Earth, and hindring the Evaporation of those sulphureous Steams, which are the Efficients of it, I know not. The same Night succeeded some Strokes of Thunder and Flashes of Lightning, both here and at *London* ; and since then, we have had great Storms of Wind. I might have taken Notice, that, for some Mornings before, we had smart Frosts for the time of the Year.

SINCE this was written, and sent away in order to printing, I am advis'd, by Letter from my honoured Friend Dr. *Tancred Robinson*, that this Earthquake was not confin'd to some Counties of *England*, as *Middlesex*, *Essex*, *Kent*, *Sussex*, *Hampshire*, &c. but spread far into Foreign Parts ; an Account whereof I shall give you in the Doctor's own Words. *The Concussion or Vibration of our late Earth-*
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quake was felt in most Parts of the Dutch and Spanish Netherlands, as also in Germany and France: It affected Places most upon the Sea-Coasts, and near the great Rivers, as Zealand, Cologne, Mentz, and the Bridge of London. It went not beyond 52 Degrees and 40 Minutes of Northern Latitude; how far it reach'd to the South and East, is not yet certainly known, for Want of good Intelligence; we have already traced it beyond Paris, to the 48 Degree of N. Latitude, and beyond the Rhine, on the East to Francfort; so that we know, at present, of 260 Miles square shaken by it. The Motions of some Machines were very sensibly stop'd or retarded by the Choc, especially Pendulums: And there were some Alterations in the Air, (as to its Smell, Spring, and Gravity) both before and after. The Time of its happening here in England, and beyond the Seas, seems to vary some Minutes; but that may easily be accounted for by the Difference of Meridians. Thus far the Doctor. Dat. Septemb. 22.

THE Duration or Continuance of it (as I am informed by some curious and attentive Observers) about London, was about two Minutes; here not so long.

THE Manner of the Motion, as I am assured by my learned and ingenious Friend and Neighbour Mr. Allen, Physician in Braintree, who had it from several intelligent and observant Persons hereabouts, and that lived in

in distant Places, was first a manifest Heaving upwards, and after that a Trembling, or Vibration, or Agitation to and fro. So that in the first respect, its Motion seemed to resemble that of the Blood in an Artery, stretching the Channel as it passed.

THE Motion of it was most considerable upon the Hills, and in Valleys.

THE Effect it had upon those who were sensible of it, was a Swimming or Dizziness in their Heads; and this was general upon all. In some it affected their Stomachs, and created a Loathing, and Inclination to Vomit: Some of the tenderer Sex found in themselves such a Disposition as they have had before a swooning Fitt. All which must be the Effects, either of the Heaving, or tremulous Motion, or both; and yet, no Motion of Boat or Coach doth so suddenly affect and disturb the Head or Stomach.

Lastly, It was attended with a Noise, as our Earthquakes generally in *England* are, as is observed by Mr. *Pigot* in that of *Oxford* in the Year 1683. and by myself when I lived in *Sutton-Cosfield*, in one that happen'd there in the Winter-time, as I remember, in the Year 1677. and extended at least 40 Miles in Length into *Worcestershire*. The Noise I heard, seem'd to be in the Air. This Noise, hereabouts, was heard but in few Places, and by few Persons; but yet I am well assured by some, and those of the Vulgar and Ignorant

fort, who reported it of themselves, having no reason to feign it, and who had never heard that any such thing accompanied Earthquakes.

FROM many of the afore-mentioned Particulars, it may be collected, That the Caverns, in which the inflamed Damp, causing this Earthquake, was contained, lie deep in the Earth.

FOR, 1. It could not else have shook such a vast Extent of Ground, both Hills and Valleys in *England*, and beyond Seas, (the Motion not being stopt by the Channels of great Rivers or even Creeks of the Sea) unless, I say, the containing *Cuniculi* or Conduits had passed under the very Bottom of the narrow Seas: Which is a great Confirmation of what we have before delivered concerning the Mountains of *Ætna*, *Stromboli*, and *Vesuvius*, communicating by submarine Vaults.

2. IF the Caverns had not lain deep, the enclosed Damp would, in all likelihood, somewhere or other, have rent the superincumbent Earth, and broken forth in the Form of a Flame.

AND yet, notwithstanding the Depth, it should seem, it found so much Vent as to affect the external Air, and create a Sound: For if the Caverns, wherein the Damp was, had been close shut up with such a thick Coat of Earth, I doubt whether the Trembling

bling and Vibration of the soft Earth alone, would have produced such a Noise abroad in the Air; and the Vapour of it also made a shift to struggle through the Pores of the Earth into the open Air, in such Quantity as to affect the Sense; a sulphurous Scent having been observed in the Air, both before and after the Concussion.

It is, moreover, very remarkable, That there were some particular Spots which were not at all stirred in those Countries where the Places, not far distant round about, were shaken; as *Sturbridge-Fair* before-remembered, and that where my Dwelling is; neither myself, nor any of my Family, though they were Above-stairs, nor any of our near Neighbours, being sensible of the least Motion or Impression of it, and yet those living within less than half a Mile, had their Houses considerably shaken by it.

It is also worth the noting, That both this, and all other Earthquakes I have heard or read of in *England*, have been very short, and finished at one Explosion; which is an Argument that the Cavities and *Cuniculi*, wherein the inflamed Matter is contained and moves, are very strait, and of small Dimensions. Explosion I call it, because by the Quickness of the Motion, it seems rather to resemble that of Powder in a Gun, than that of a Squib running in a Train of Powder. Though others I have read of, whose Motion

was very slow; as that observed by the Honourable Mr. Boyle, and described in the *Philosophical Transactions*, Numb. 11. Had we certain Knowledge where the greatest Force of this Earthquake was, we might thence learn where its first Accension was, and which way it spread itself. But I have not time to enlarge farther concerning it, or to give an Account of all its *Phænomena*, lest I injure the Printer by stopping the Press: Neither, indeed, would it be Prudence to attempt it, till we have a more particular and perfect History of it.

SINCE this was written and sent away to the Printer, Intelligence is come from beyond the Seas, that *Flanders*, and all *Holland*, Part of *France* and *Germany*, were shaken by this Earthquake, and, consequently, the interjacent Provinces; which is a clear Demonstration of our Opinion, That the inflamed Damp, which caused it, was lodged deep in the Earth, the *Cuniculi* or Caverns, which contained it, passing under the very Bottom of the Sea. It is also a great Confirmation of what we have delivered concerning the Mountains of *Ætna*, *Stromboli*, and *Vesuvius*, communicating by submarine Passages. Add hereto, that *Gassendus*, in the Life of *Peireskius*, reports, That at the Mountain *Semo* in *Æthiopia*, there happened a Burning at the same time with that of *Vesuvius* in *Campania*, viz. in the Year

1633.

1633. So that not only *Vesuvius* communicates with *Ætna* by subterraneous Vaults, but also (as he rationally inferrs) *Ætna* with the Mountains of *Syria*, the Tunnels running under the Depths of the *Mediterranean Sea*, and those with the *Arabian*; and, lastly, the *Arabian* with Mount *Semo* in *Æthiopia*.

THAT an inflamed Damp or subterraneous Fire is the Cause of all Earthquakes in general, and not only such as precede the Eruptions of *Vulcano's*, may be proved by an eminent Instance of an Earthquake happening *May 12. 1682.* which shook the greatest Part of *France* and *Switzerland*, and reach'd as far as *Collen* in *Germany*: An Account whereof we have in the *Journal des Sçavans*, set forth *June 1. 1681.* inserted in the *Weekly Memorials* printed for Mr. *Faithorne*, Numb. 23. In which they write, That it was perceived in *Lionnois*, (which was wont to pass for a Place exempt from such Accidents) in *Dauphiny* and *Beaujolois*, though very little, and without any ill Consequence. That at *Mets* in *Lorrain*, the Watch-place of a Bulwark was thrown down into the Ditch, with the Soldier that stood Centinel there.

THAT at *Tonnerre*, the Houses and Churches were so terribly shaken, as if several Coaches with six Horses had driven along full speed through the Streets; and that it threw

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down several Rocks on the side of *Bourbirant*. They tell also, that it stopt a Fountain at *Raviere*, hard by, (which at fifty Paces from its Head, turns a Mill) for half an Hour.

THAT it was perceived in *Provence*, by the Shaking of Windows and Beds, and Opening of Doors; and that it had two several Motions or Pulses, as ours also was, by some, observed to have: And that the Domestick Animals, as Sheep, Cows, Horses, and Poultry, did discover their Fear by unusual Motions and Cries. And the Sheep at *Dijon* in *Burgundy*, could not be stop'd from getting into their Stalls at Four of the Clock in the Afternoon, which were not then wont to betake themselves thither till Sun-set.

THAT the Cities of *Orleans*, *Troyes*, *Sens*, *Chalons*, *Joinville*, *Reims*, *Soissons*, *Laon*, *Mascon*, *Dole*, *Strasbourg*, &c. felt the Effects of it.

BUT at *Remiremont* upon the *Moselle*, where it exerted its greatest Force, throwing down several Houses, insomuch that the Inhabitants were forced to betake themselves into the Fields for six Weeks time; there was a Noise heard like Thunder, and Flames frequently broke out of the Earth of a noisome Scent, but not sulphureous, and which burnt nothing; yet was there no Rift or Chap in the Ground, save only in one Place; the Depth whereof was in vain search'd,

search'd, and which afterwards closed up. And before this Earthquake also, Flames appeared for four Days upon a Mountain near *Geneva*.

It is very strange and remarkable, that the Flames that issued out, were of the Nature of an *Ignis fatuus*, and burnt nothing; and that the Earthquake raged every Night, and never in the Day-time.

CONCERNING Earthquakes, I shall only add two Observations.

1. THAT it is not likely that they spend all their Strength upon Cities, but do indifferently shake, break in funder, and throw down Mountains and Rocks; and seeing few Cities there are but have been shaken, and many ruined and subverted by them, and leveled with the Ground; there is good Reason to think, that few Rocks or Mountains have escaped their Fury, but have suffered the like Concussions and Alterations.

2. THAT the Changes that have hitherto happened in the Earth by Earthquakes, have not been so considerable as to threaten a Dissolution of the present System of the Terrestrial Globe, should there be a like Succession of them to Eternity. Unless we will except that unparallel'd universal One, which happened in the Days of *Valentinian* the First, (which we have already mentioned) by which the whole known World, both Land and Sea, and it's like the then unknown too, were violently

violently shaken; which might seem to be a Prelude to the future Conflagration, or Destruction of the whole, by such a Confusion and Dashing in Pieces of all the Parts of it, one against another, as the *Stoicks* speak of.

Of the Effects of burning Mountains or *Vulcano's*, I have already said something, and shall, afterwards, have occasion to say more. In brief, 1. They cast forth out of their Mouths, and scatter all over the Country, sometimes to a very great Distance, abundance of Sand and Ashes. *Dion Cassius* reports, That in the noted Deflagration of *Vesuvius*, in the Time of *Titus* the Emperor, there was so much Cinders and Ashes vomited out of its flaming Tunnel, and with that Fury and Violence, that they were transported over Sea, into *Africa*, *Syria*, and *Egypt*; and, on the other side, were carried as far as *Rome*, where they darkned the very Air, and intercepted the Sun-beams. At which time, by the Fury of this Burning and Tempest, the whole Mountain and Earth thereabouts was so shaken, that two adjoining Cities, *Herculanium* and *Pompeii*, were destroyed with the People sitting in the Theater. And the famous Natural Historian *Pliny* the Elder, then Admiral of the *Roman* Navy, out of a Curiosity of searching out the Causes and Nature of the Deflagration, approaching too near the Mountain, and staying too long there,

there, was suffocated with the sulphureous Smoke and Stench thereof.

OF another Eruption of the same *Vesuvius*, we read, in the Time of *Leo* the Emperor, wherein the Ashes thereof, transported in the Air, obscured all *Europe*, being carried as far as *Constantinople*; and that the *Constantinopolitans* being wonderfully affrighted therewith, (insomuch as the Emperor forsook the City) in memory of the same did yearly celebrate the Twelfth of *November*.

2. THEY also pour out huge Floods of melted Minerals, Stones, and other Materials, running down like Rivers for many Miles together; as did the Mountain *Ætna* in that last and most famous Eruption, disgorgeing such mighty Streams of fiery running Matter, as flowed down to *Catana*, above twenty Miles distant, and advanced a considerable way into the very Sea itself.

2. THE next thing I shall mention, is the extraordinary Floods caused by long continuing Showers, or violent and tempestuous Storms and Shots of Rain.

THE most ancient and memorable of this Kind is that of *Deucalion*, of which we have already discoursed sufficiently. *S. Hierome*, in the Life of *Hilarion*, (as I find him quoted by *Dr. Hakewill*) speaks of a Flood and Inundation after the Death of *Julian*, in which *Naves ad prærupta montium delatæ pependērunt*, the Ships being landed upon
the

the Tops of the Mountains, there stuck. Which, whether it proceeded from Rain, or from an Irruption of the Sea, or from both Causes together, he doth not say: But if it were literally true, and not hyperbolically exaggerated, then may some Credit be given to what *Sabin*, in his Commentaries upon *Ovid's Metamorphosis*, reports, *Ex Annalium monumentis constat Anno 1460. in Alpibus inventam esse Navim cum anchoris in cuniculo per quem metalla effodiuntur:* It appears by the Monuments of History, that in the Year 1460. in a Mine of the Alps, was found a Ship with its Anchors; in Confirmation of what that Poet writes:

*Et vetus inventa est in montibus anchora
summis.*

IN the Year of our Redemption 590. in the Month of *October*, *Gregory* being then Bishop of *Rome*, there happened a marvellous Overflowing in *Italy*, and especially in the *Venetian* Territory, and in *Liguria*, accompanied with a most fearful Storm of Thunder and Lightning; after which followed the great Plague at *Rome*, by reason of many dead Serpents cast up, and left upon the Land, after the Waters decreased and returned.

STROZIUS SIGOG, in his *Magia omnifaria*, telleth of an Inundation in *Italy*, in the Time of Pope *Damasus*, in which also many Cities

Cities of *Sicily* were swallowed : Another in the Time of *Alexander* the Sixth. Also, in the Year 1515. *Maximilian* being Emperor, he also remembers a perilous Overflowing in *Polonia* about *Cracovia*, by which many People perished.

LIKEWISE *Vignier*, a *French* Historian, speaketh of a great Flood in the South Part of *Languedoc*, which fell in the Year of our Lord 1557. with so dreadful a Tempest, that all the People attended therein the very End of the World and Judgment-Day, saying, That by the violent Descent of the Waters about *Nismes*, there were removed divers old Heaps and Mountures of Ground, and many other Places torn up and rent ; by which Accident, there was found both Coin of Silver and Gold, and divers Pieces of Plate, and Vessels of other Metal, supposed to be hidden at such time as the *Goths* invaded that Province. These Stories related in the three last Paragraphs, I have borrowed of Sir *Walter Raleigh* his *History of the World*.

To which I shall add one of late Date happening in *Sicily*, a Narrative whereof communicated in a Letter from *Palermo*, dated *June* the 25th, 1682. I met with in the *London Gazette*, Numb. 1742. in the following Words: *We have an Account from the Town of Tortorica, That on the Sixth Instant, about Seven a Clock in the Evening, after so great a Darknes that no Object could*
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be distinguished at the Distance of four Paces, there arose such a great Storm of Rain, Lightning, and Thunder, which lasted Six and thirty Hours, that about One a Clock the next Morning, great Torrents of Water, caused by these Rains, fell down from the neighbouring Mountains with so great Rapidity, that they carried with them Trees of an extraordinary Bigness, which threw down the Walls and Houses of the Town they happened to beat against. The Waters were so violent that they overthrew the Church of S. Nicholas; and the Arch-Deacon of the Town, who retired thither, perished there with many other Persons: There remaining only one Abby, and about fifty Houses, and those so shattered, that they fell one after another. There were about Six hundred of the Inhabitants drown'd, the rest being a-broad in the Field gathering their Silk, fled to the Mountains, where they suffered very much for Want of Provisions. The Goods, Trees, Stone, Sand, and other Rubbish, which the Waters carried away, were in so great Abundance, that they made a Bank above the Water, two Miles in Length, near the Mouth of the River, where, before, the Sea was very deep. This Town is situate in that Part of Sicily called the Valley of Demona, on the side of the River Tortorica, about Five and twenty Miles from the Tuscan Sea. The Towns of Randazzo and Francaville,
and

and several others, have likewise been destroyed by this great Flood. It is added, that Mount *Ætna* casts out such abundance of Water, that all the neighbouring Country is drowned. Which if it be true, (as I see no Reason to doubt it) this is a farther Proof against *Borellius*, that the Caverns of *Ætna* are more than superficial, and reach down to the very Roots and Foundations of that Mountain, communicating with the subterraneous Abyfs, and the Sea itself, from whence, in all likelihood, these Waters were derived, as is evident in those poured out by *Vesuvius*.

MANY other Floods we read of in Histories, whether caused by Rains or Inundations of the Sea, is uncertain; and, therefore, I shall not spend time in setting them down. The Effect of all which, relating to the Earth in general, is, the Wasting and Washing away of Mountains and high Grounds, the Raising of the Valleys and Bottoms, and, consequently, Leveling of the Earth, and Landing up of the Sea.

3. THE last thing I shall mention, which hath effected considerable Changes in the Earth, is boisterous and outrageous Winds and Hurricanes, of which I need not give Instances, they every Year almost happening. These, I conceive, have a great Interest in the Inundations of the Sea we have before mentioned. These raise up those great Hills or
Downs.

Downs of Sand we see all along the Coasts of the *Low-Countreys*, and the Western-Shores of *England*, and the like Places. These sometimes blow up so much Sand, and drive it so far as to cover the adjacent Countrys, and to mar whole Fields, yea, to bury Towns and Villages. They are also a concurrent Cause of those huge Banks and Shelves of Sand, that are so dangerous to Mariners, and bar up Havens, and ruin Port-Towns; of which many Instances might be given.

I FIND in Dr. *Hakewill's* Apology, a Story or two, shewing the great Force and Strength of Winds; the one taken out of *Bellarmino's* Book, *De ascensu mentis in Deum per scal. creat. grad. 2. Vidi ego* (saith the Cardinal) *quod nisi vidissem non crederem, à vehementissimo vento effossam ingentem terræ molem, eamque delatam super pagum quendam ut fornea altissima conspiceretur, unde terra eruta fuerat, & pagus totus coopertus, & quasi sepultus manserit, ad quem terra illa devenerat: i. e. I myself have seen, which if I had not seen, I should not have believed, a very great Quantity of Earth, digged out and taken up by the Force of a strong Wind, and carried up a Village thereby, so that there remained to be seen a great empty Hollownes in the Place from whence it was lifted, and the Village upon which it lighted was in a manner all covered over and buried in it.*

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THE other out of *Stow*, who reports, That in the Year 1095. during the Reign of King *William Rufus*, there happened in *London* an outrageous Wind, which bore down in that City alone Six hundred Houses, and blew off the Roof of *Bow-Church*, with which the Beams were borne into the Air a great Height, six whereof being 27 Foot long, with their Fall were driven 23 Foot deep into the Ground, the Streets of the City lying then unpaved.

Now then to sum up what we have said ; The Changes and Alterations that have been made in the superficial Part of the terraqueous Globe, have been effected chiefly by *Water, Fire, and Wind*. Those by *Water* have been either by the Motions of the *Sea*, or by *Rains* ; and both either ordinary or extraordinary : The ordinary Tides and Spring-Tides of the *Sea* do wash away the Shores, and change Sand-Banks, and the like. The extraordinary and tempestuous Motions of the *Sea*, raised by raging and impetuous Winds, subterraneous Fires, or some other hidden Causes, overwhelm Islands, open *Fretums*, throw up huge Beds and Banks of Sand, nay, vast Baiches of Stone, extending some Miles, and drown whole Countrys. The ordinary *Rains* contribute something to the daily Diminution of the Mountains, filling up of the Valleys, and atterrating the Skirts of the Seas. The extraordinary *Rains* causing

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causing great Floods and Deluges, have more visible and remarkable Influences upon such Mutations, doing that in a few Days which the ordinary Weather could not effect, it may be, in a hundred Years.

IN all these Changes the Winds have a great Interest ; the Motion of the Clouds being wholly owing to them, and, in a great measure also, the Overflowings and Inundations of the Sea.

WHATEVER Changes have been wrought by Earthquakes, Thunders, and Eruptions of *Vulcano's*, are the Effects of Fire.

ALL these Causes co-operate toward the lowering of the Mountains, leveling of the Earth, straitning and landing up of the Sea, and, in fine, compelling the Waters to return upon the dry Land, and cover the whole Surface of it, as at the first. How to obviate this in a natural way, I know not, unless by a Transmutation of the two Elements of Water and Earth one into another, which I can by no means grant. 'Tis true indeed, the rocky Parts of the Mountains may be so hard and impenetrable, as to resist and hold out against all the Assaults of the Water, and utmost Rage of the Sea ; but then all the Earth and Sand being washed from them, nothing, but as it were their *Skeletons*, will remain extant above the Waters, and the Earth be in effect drowned.

BUT

BUT tho' I cannot imagine or think upon any natural Means to prevent and put a Stop to this Effect, yet I do not deny that there may be some; and I am the rather inclinable so to think, because the World doth not in any Degree proceed so fast towards this Period, as the Force and Agency of all these Causes together seem to require. For, as I said before, the Oracle predicting the Carrying on the Shore of *Cilicia* as far as *Cyprus*, by the Earth and Mud that the turbid River *Pyramus* should bring down, and let fall in the interjacent Strait, is so far from being filled up, that there hath not any considerable Progress been made towards it, so far as I have heard or read; in these 2000 Years. And we find by Experience, that the longer the World lasts, the fewer Concussions and Mutations are made in the upper or superficial Region of the Earth; the Parts thereof seeming to tend to a greater Quiet and Settlement.

IN this Conjecture I find myself mistaken. For since the Writing hereof there have happened as terrible and destructive Earthquakes as any we read of in History; particularly those of *Sicily* in the Year 1692-3. the first on Jan. 9. about four Hours and a half after Sun-set; the second on the 11th of the same Month, about the 21st Hour of the Day, according to the *Italian* Reckoning, that is, three Hours before Sun-set. In both which

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there perished 93000 Souls ; were destroyed and much damnified 2 Bishopricks, 700 Churches, of which 22 Collegiate ones, 250 Monasteries, 49 Cities and Villages, whereof the most remarkable was the City of *Catania*, one of the fairest and largest in the Island, which was wholly overthrown and buried in its Ruins, scarce any Footstep of it remaining, wherein perished above 15000 Souls : Of which the learned and ingenious Signor *Paulo Bonone* gives a particular Account, in his Book entituled, *Museum Physicum & Experimentale*; and besides affords us many curious Remarks and Observations, concerning the Signs, Concomitants and Effects of these Earthquakes, which being too long to transcribe, it not being my Design to write a complete Treatise of Earthquakes, but only to discourse a little of them occasionally, as they, or rather the Cause of them, might possibly have been the Means or Instruments the Almighty made use of at first to raise up the dry Land, and cast off the Waters ; I referr the Reader to the Book itself.

2. THOSE of *Naples*, or *Terra di Lavoro*, anciently called *Campania Felix*, happening on the fifth of *June* 1688. of which Mr. *Misson* gives us an Account at the End of his *New Voyage to Italy*, Vol. 1. sent in a Letter from an *Englisch* Merchant then living in

in Naples to his Friend, in these Words: Sir, About eight Days ago we all believed the World was at an End. We felt a most terrible Earthquake in this Town of Naples; It lasted but three Minutes, but in that little time such Things happened, as without all Doubt were done by the Hand of the Almighty. About a quarter of an Hour after four in the Afternoon, a terrible Earthquake shook the whole City all of a sudden, and put the People into such a Confusion as cannot be expressed. Mount Vesuvius being quiet, no Body mistrusted any such Thing: And though they perceived the Houses to stoop, and to recover again, to part from one another, to move every where, and in some Places to fall, their Astonishment was so great, and their Eyes so dazzled, that some cried out Fire, others fancied to themselves some popular Sedition, and very few guessed what it really was. But another more violent Earthquake succeeding the first, a subterraneous Noise, surpassing that of Thunder, was heard and accompanied by a Domestick Noise of all the Household Goods, which were overturned, and a good Part of them either broken or bruised. The Bells rang in all the Steeples, the Cisterns vomited up their Waters, several Houses parted from each other, some rejoined, others fell, and some stood as if they were stooping and ready to fall. Then every one was sensible that it was an Earthquake,

quake, &c. To this succeeded a third Trembling, which the *Writer* only mentions. Not many People were lost in this Earthquake at Naples; but the Damage sustained by it was reckoned by knowing Persons to amount to Ten Millions of Crowns. At the Town of Benevento there were 1567 Persons crushed to Pieces, and buried under Ruins; so that that Town is nothing now but a Heap of Stones. We have here a List of 800 Persons more killed in twelve or thirteen Villages about the said City of Benevent. The Town of Cerreto, belonging to the Duke of Mattalone, was entirely overturned, and 4000 Persons perished therein. Five Hundred were also lost at Mirabella, 1000 at S. Lupo, 300 at S. Lawrence Major, 400 at Pierra Roya, and every Soul, without any ones escaping, at the Boroughs of Civitella, S. Lawrence Minor, and Guardia S. Framondi.

3. To these may be added the terrible Earthquake in the Island of *Jamaica*, whereof we have already discoursed at large.

BESIDES, the Superficies of the Sea, notwithstanding the Overwhelming and Submersion of Islands, and the Straitning of it about the Outlets of Rivers, and the Earth it washes from the Shores subsiding, and elevating the Bottom, seems not to be raised higher, nor spread farther, or bear any greater Proportion to that of the

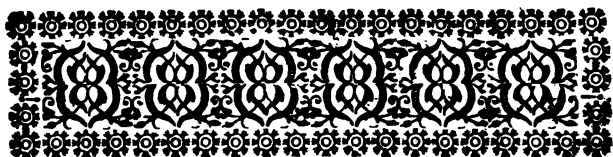
the Land than it did a Thousand Years ago.

So have I finished my second Discourse concerning the Deluge and its Effects ; and the Mutations that have been since made in the Earth, and their Causes.



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DISCOURSE III.

OF THE

DISSOLUTION
OF THE

WORLD.

THE

INTRODUCTION
TO THE

Third Discourse.



HERE is implanted in the Nature of Man a great Desire and Curiosity of fore-knowing future Events, and what shall befall themselves, their Relations and Dependents in time to come ; the Fates of Kingdoms and Commonwealths, especially

especially the Periodical Mutations, and final *Catastrophe* of the World, Hence, in ancient Times, Divination was made a Science or Mystery, and many Nations had their Colleges or Societies of Wise-Men, Magicians, Astrologers and Sooth-sayers ; as for Example, the *Egyptians*, *Babylonians* and *Romans*. Hence the Vulgar are very prone to consult Diviners and Fortune-Tellers.

To gratify in some Measure this Curiosity, and that his People might not in any Privilege be inferiour to the Nations about them, it pleased God, besides the standing Oracle of *Urim*, not only upon special Occasions to raise up among the *Jews* extraordinary Prophets, by immediate Mission; but also to settle a constant Order and Succession of them, for the Maintenance and Upholding whereof, there were Colleges and Seminaries instituted for the educating and fitting young Men for the Prophetick Function. These were the Sons of the Prophets, of whom we find so frequent Mention in Scripture.

MOREOVER, it pleased God so far to condescend to the Weakness of the *Jews*, that in the Infancy of their State, He permitted them to consult His Prophets concerning ordinary Accidents of Life, and Affairs of small Moment: As we see *Saul* did *Samuel* about the Loss of his Father's Asses, which it's not likely he would have done, had it not been usual

sual and customary so to do. In the latter Times of that State, we read of no Consulting of Prophets upon such Occasions. At last also by their own Confession, the Spirit of Prophecy was quite taken away, and nothing left them but a Vocal Oracle, which they called *Bath kol*, i.e. the Daughter of a Voice, or the Daughter of Thunder, a Voice out of a Voice. This Dr. * *Lightfoot* thinks to have been a meer Fancy or Imposture. *Quæ de Bath Kol referunt Judæi, ignoscant illi mihi si ego partim pro Fabulis habeam Judaicis, partim pro præstigiis Diabolicis.* What the Jews report concerning Bath Kol, I beg their Pardon, if I esteem them no other than either Jewish Fables, or Diabolical Illusions. It is a Tradition among them, that after the Death of the last Prophets, *Haggai*, *Zachary*, and *Malachi*, the Holy Spirit departed from Israel. But why, I beseech you, was Prophecy withdrawn, if Celestial Oracles were to be continued? Why was *Urim* and *Thummim* taken away, or rather not restored, by their own Confession, after the Babylonish Captivity? It were strange indeed, that God taking away His ordinary Oracles from a People, should bestow upon them one more or equally noble; and that, after they were extremely degenerated and fallen into all manner of Impiety, Superstition and Heresy, &c. And a little after, if I may freely speak what I think, those innumerable Stories,

* *Hora*
Hebr. in
Matth.
cap. 3. v.
 17.

Stories, which every where occur [in the Jewish Writings] concerning *Bath Kol*, are to be reduced to two Heads, viz. 1. The most of them are meer Fables, invented in Honour of this or that Rabbin, or to gain Credit to some History. 2. The rest meer Magical and Diabolical Illusions, &c.

In the Primitive Churches of Christians planted by the Apostles, there was also an Order of Prophets, 1 Cor. xii. 28. God hath set some in the Church; first Apostles, secondarily Prophets, &c. This Spirit of Prophecy was an extraordinary and temporary Gift, as were the Gifts of Healing and Speaking with Tongues, continuing not long after the Death of the Apostles, and Consignation of the Canon of Scripture. So that now we have no Means left us of Coming to the Knowledge of future Events, but the Prophecies contained in the Writings of the Holy Penmen of Scripture, which we must search diligently, consider attentively, and compare together, if we desire to understand any thing of what shall befall the Christian Church or State in Time to come.

THIS Text which I have made Choice of for my Subject, is Part of a Prophecy concerning the greatest of all Events, the Dissolution of the World.



2 PETER iii. II.

*Seeing then all these Things
shall be dissolved, what man-
ner of Persons ought we to
be in all holy Conversation
and Godliness?*



C H A P. I.

*The Division of the Words and Doctrine
contained in them, with the Heads of
the following Discourse.*

THESE Words contain in them
two Parts : 1. An Antecedent,
or Doctrine, *All these things shall
be dissolved.* 2. A Consequent,
or Inference thereupon, *What
manner of Persons ought we to be?*

THE Doctrine, here only briefly hinted,
or summarily proposed, is laid down more
fully in the precedent Verse; *But the Day of
the LORD will come as a Thief in the Night,
in which the Heavens shall pass away with a
great*

great Noise, and the Elements shall melt with fervent Heat, the Earth also, and the Works that are therein shall be burnt up.

THESE Words are, by the Generality of Interpreters, Ancient and Modern, understood of the final Destruction or Dissolution of Heaven and Earth; in which Sense I shall choose rather to accept them at present, than with the Reverend and Learned Dr. *Hammond*, and some few others, to stem the Tide of Expositors, and apply them to the Destruction of *Jerusalem* and the Jewish Polity. I say then,

That this World, and all things therein Doctr.
contained, shall one Day be dissolved and destroyed by Fire.

By *World*, in this Proposition, *We*, and by *Heaven* and *Earth* in this Place, the most rational Interpreters of Scripture, do understand only the whole *Compages* of this Sublunary World, and all the Creatures that are in it; all that was destroyed by the Flood in the Days of *Noah*, and is now secured from perishing so again; that I may borrow Dr. *Hammond's* Words, in his Annotations on this Place. 'And again, the Word *Heavens* (*saith he*) being an Equivocal Word, is used either for the superiour Heavens, whether Empyrean or Ethereal, or for the sublunary Heavens, the Air, (as the Word *World* is either the whole *Compages* of the superiour
'and

and inferiour World, as the Author of the Book *De Mundo*, ascribed falsely to *Aristotle*, defines *Κόσμος, σύνμαζα ἔξ οὐρανῶ καὶ γῆς καὶ τῶν ἐν τέτοις περιεχουσέων φύσεων*, *The System or Compages of Heaven and Earth, and the Beings therein contained*: Or else only of the sublunary Lower World) we may here resolve, that the *Οὐρανοὶ* and *στοιχεῖα*, Heaven and Host, or Elements thereof, are literally the sublunary Aereal Heavens, and all that is therein, Clouds and Meteors, &c. Fowls and flying Creatures, and so, fit to join with the Earth and Works that are therein.

IN Prosecution of this Proposition, and in Order to the Proof and Confirmation, and likewise the Clearing and Illustration of it, I shall, (1.) Give you what I find concerning the Dissolution of the World: 1. In the Holy Scripture. 2. In ancient Christian Writers. 3. In the Heathen Philosophers and Sages. (2.) I shall endeavour to give some Answer to these seven Questions, which are obvious and usually made concerning it.

1. WHETHER there be any thing in Nature, which might prove and demonstrate, or argue and infer a future Dissolution of the World?

2. WHETHER shall this Dissolution be brought about and effected by Natural, or by extraordinary Means and Instruments; and

and what those Means and Instruments shall be?

3. WHETHER shall the Dissolution be gradual or sudden?

4. WHETHER shall there be any Signs and Fore-Runners of it?

5. AT what Period of Time shall the World be dissolved?

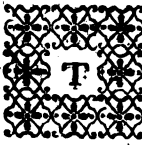
6. HOW far shall this Conflagration extend? Whether to the *Ethereal* Heavens, and all the Host of them, Sun, Moon, and Stars, or to the *Aereal* only.

7. WHETHER shall the Heavens and Earth be wholly dissipated and destroyed, or only refined and purified?

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## CHAPTER II.

### *The Testimonies of Scripture concerning the Dissolution of the World.*

1.  WHEN, let us consider what we find delivered in the Holy Scriptures, concerning the Dissolution of the World. And first of all, This Place, which I have made Choice of for my Text, is in my Opinion the most clear and full, as to this Particular, in the whole Scripture; and will give Light for the Solution of most of the proposed

posed Questions. Verſ. 10. *The Day of the LORD ſhall come as a Thief, &c.* This answers the third Queſtion, Whether the Diſſolution ſhall be gradual or ſudden? *Wherein the Heavens ſhall paſs away with a great Noiſe, and the Elements ſhall melt with fervent Heat, the Earth alſo, and all the Works that are therein, ſhall be burnt up.* And again, Ver. 12. *Wherein the Heavens being on Fire ſhall be diſſolved, and the Elements ſhall melt with fervent Heat.* This answers the ſecond Queſtion, What the Means and Inſtruments of this Diſſolution ſhall be? Ver. 13. *Nevertheless we, according to his Promiſe, look for a new Heaven and a new Earth, wherein dwelleth Righteouſneſs.* This gives ſome Light toward the answering of the laſt Queſtion, Whether ſhall the Heavens and the Earth be wholly burnt up and deſtroyed, or only renewed and purified? Theſe Words, as clearly as they ſeem to refer to the Diſſolution of the World, yet Dr. Hammond doubts not to be underſtood of the remarkable Deſtruction of *Jeruſalem*, and the Jewish State, he thus paraphraſing them.

Verſe 10. *But the Day of the LORD will come as a Thief in the Night, in which the Heavens ſhall paſs away with a great Noiſe, and the Elements ſhall melt with fervent Heat, and the Earth alſo, and the*

*the Works that are therein shall be burnt up.*

BUT this Judgment of CHRIST, so remarkable on the *Jews*, shall now shortly come, and that very discernably; and the Temple shall suddenly be destroyed, the greater Part of it burnt, and the City and People utterly consumed.

... Verse 11. *Seeing then all these Things shall be dissolved, what Manner of Persons ought ye to be in all holy Conversation and Godliness?*

SEEING then this Destruction shall thus involve all, and now approacheth so near, what an Engagement doth this lay upon us to live the most pure strict Lives that ever Men lived?

Verse 12. *Looking for and hastning unto the Coming of the Day of GOD, wherein the Heavens, being on Fire, shall be dissolved, and the Elements shall melt with fervent Heat.*

LOOKING for the Coming of CHRIST for our Deliverance, and by our Christian Lives quickning and hastning GOD to delay it no longer; that Coming of His, I say, which as it signifies great Mercy to us, so it signifies very sharp Destruction to the whole *Jewish* State.

X

Verse

Verſe 13. *Nevertheless we, according to His Promise, look for new Heavens and a new Earth, wherein dwelleth Righteouſneſs.*

INSTEAD of which we look for a new Chriſtian State, wherein all Proviſion is made by CHRIST for Righteouſneſs to inhabit, according to the Promise of CHRIST concerning the Purity that He ſhould plant in the Evangelical State.

How he makes out and confirms this Paraphraſe, ſee in his *Annotations* upon this Place. So confident is he of the Truth of this his Interpretation, that he cenſures the uſual one as a great Miſtake, in his *Annotation* on ver. 10. where he thus writes; ‘What  
‘is here thus expreſſed by S. Peter, is ordina-  
‘rily conceived to belong to the End of the  
‘World, and by others applied to the End of  
‘this World, and the Beginning of the *Millen-*  
‘*nium*, or Thouſand Years. And ſo, as S. Peter  
‘here ſaith, ver. 16. many other Places in  
‘S. Paul’s Epiſtles, and in the Goſpel, eſpeci-  
‘ally *Matth.* xxiv. are miſtaken and wreſted.  
‘That it doth not belong to either of thoſe,  
‘but to this fatal Day of the *Jews*, ſufficiently  
‘appears by the Purport of this whole Epiſtle,  
‘which is, to arm them with Conſtancy and  
‘Perſeverance till that Day come; and par-  
‘ticularly in this Chapter, to confute them  
‘who object againſt the Truth of CHRIST’S  
‘Pre-

' Predictions, and resolve it should not come  
 ' at all: Against whom he here opposes the  
 ' Certainty, the Speediness, and the Terrible-  
 ' ness of its Coming. That which hath given  
 ' Occasion to those other common Mistakes, is  
 ' especially the Hideousness of those Judg-  
 ' ments which fell upon the People of the  
 ' *Jews*, beyond all that ever before are rela-  
 ' ted to have fallen upon them, or indeed a-  
 ' ny other People, which made it necessary  
 ' for the Prophets, which were to describe it,  
 ' (and who use Tropes and Figures, and not  
 ' plain Expressions, to set down their Predi-  
 ' ctions) to express it by these high Phrases, of  
 ' the *passing away* and *dissolving* of *Heaven* and  
 ' *Earth*, and *Elements*, &c. which sounding  
 ' very tragically, are mistaken for the great  
 ' and final Dissolution of the World." So far  
 the Doctor. Two Things there are in this  
 Chapter, which seem to contradict this In-  
 terpretation: First, That the Destruction  
 here spoken of, is compared with *Noah's*  
 Flood; and the Heaven and Earth to be dis-  
 solved by this, made parallel, and of equal  
 Extent to the World destroyed by that. Of  
 this the Doctor was well aware, and there-  
 fore grants, that the seventh Verse, *But the*  
*Heavens and the Earth which are now, by the*  
*same Word are kept in Store, reserved unto Fire*  
*against the Day of Judgment, and Perdition of*  
*ungodly Men*, is to be understood of the gene-  
 ral and final Destruction of the World by

Fire, but the following Verses to be an Answer to the first Part of the Atheists Objection, viz. *Where is the Promise of His Coming?* To me it seems, that all refer to the same Matter. The second Thing which seems to contradict the Doctor's Interpretation, is, the Apostle's citing for the Instruction and Confirmation of the Believers, and in Answer to the Atheists Objection, (*Where is the Promise of His Coming?*) that Place of the Psalmist, *Psal. xc. 4. That one Day is with the LORD as a thousand Years, and a thousand Years as one Day.* For the Apostle seems to suppose, that the Time of CHRIST'S Coming might possibly be a thousand Years off; and that they were not to think much, or distrust the Promise, if it were so: For though it were predicted as a thing shortly to come, yet they were to consider, that a thousand Years in GOD'S Sight is but a very short Time; so that it might be foretold as shortly to come, tho' it were a thousand Years off. Whereas it might seem improper to mention a thousand Years to support them in Expectation of an Event that was not twenty Years to come.

ANOTHER Place, where Mention is made of CHRIST'S coming to Judgment, and the Dissolution of the World, is *Matth. xxiv.* to which may be added as Parallel, *Mark xiii.* and *Luke xxi.* In which Places you have considerable, 1. The Suddenness of CHRIST'S Coming, ver.

27. As the Lightning comes out of the East, and shineth even unto the West, so shall the Coming of the Son of Man be. 2. The Signs of His Coming, v. 29. Immediately after the Tribulation of those Days shall the Sun be darkened, and the Moon shall not give her Light, and the Stars shall fall from Heaven, and the Powers of Heaven shall be shaken. 3. The Manner of His Coming, v. 30. And then shall appear the Sign of the Son of Man in Heaven; and then shall all the Tribes of the Earth mourn, when they shall see the Son of Man coming in the Clouds of Heaven with Power and great Glory. And He shall send His Angels with a great Sound of a Trumpet, and they shall gather together His Elect from the four Winds, from one End of Heaven to the other. 4. The Uncertainty of the Time of His Coming, and this Dissolution as to us. But of that Day and Hour knoweth no Man, no not the Angels in Heaven. And Mark adds, neither the Son, but the Father only.

ALL this Prophecy Dr. Hammond understands of the Destruction of the City and Temple of Jerusalem, and whole Nation of the Jews; as may be seen in his *Paraphrase and Annotations* upon this Place. And indeed, our Saviour Himself seems to limit it to this, saying, verse 24. *Verily I say unto you, this Generation shall not pass away, till all these things be fulfilled.* For if these Prophecies look farther than the Destruction of

*Jerusalem*, even to CHRIST's coming to Judgment, how could it be true, that that Generation should not pass away till all those Things were fulfilled? Whereas we see that that Generation is long since passed away, and yet the End is not come. And indeed, Expositors that understand them of the End of the World, and CHRIST's second coming to Judgment, are hard put to it to answer this Objection. S. Chrysostom will have this Word γενεὰ to be understood not of the Generation of Men then living, but of the Generation of the Faithful, which should not fail till the End of the World. Οἶδε γὰρ (saith he) γενεὰν ἐκ ἀπὸ χρόνων χαρακτηρίζειν μόνον, ἀλλ' ἀπὸ τρόπων θρησκείας καὶ πολιτείας, ὡς ὅταν λέγῃ, Αὕτη ἡ γενεὰ ζητούντων σε, &c. He denominates a Generation not only from living together in the same time, but from having the same Form and Manner of religious Worship and Polity; as in that Place, This is the Generation of them that seek thee, that seek thy Face, O Jacob. Beza understands γενεὰ of the present Age, and will have it to be of the same Valour with נַחַח in Hebrew, and πάντα ταῦτα, to referr not to all Particulars mentioned in this Chapter, but only to those which are spoken of the Destruction of the City and Nation of the Jews: But (saith he) if any one urgeth the universal Particle, *Vertere licebit, Fiant omnia, viz. quæ ultimam illam diem præcessura dixit. Nam ab illo tempore*



*tempore cæperunt fieri, & adhuc perseverant illa signa, suo demum tempore Filio hominis venturo.*

BUT on the other Side, 1. Some Passages there are in this Chapter, which are hardly applicable to the Destruction of *Jerusalem*, and the Dissolution of the *Jewish Commonwealth*; as *the Appearing of the Sign of the Son of Man in Heaven, and the Tribes seeing the Son of Man coming in the Clouds of Heaven, with Power and great Glory. And His sending His Angels with a great Sound of a Trumpet.* 2. The Coming of CHRIST is in like manner described in Places which undoubtedly speak of His coming to Judgment at the End of the World. As in *1 Cor. xv. 52.* Mention is made of the *Trumpets sounding* at the Time of CHRIST's Coming: And *1 Thess. iv. 16.* it is said, *The LORD Himself shall descend from Heaven with the Voice of the Archangel, and with the Trump of GOD; and. v. 17. We that are alive shall be caught up together with them [that are risen] in the Clouds to meet the LORD in the Air.* All which Places are perfectly parallel, and seem manifestly to allude to the fore-mentioned Words, *Matth. xxiv. 30, 31.* I am apt to think that these Prophecies may have a double Respect; one to the City, Temple, and Nation of the *Jews*; another to the whole World at the great Day of Doom: And that the former is indeed typical of the latter: And so they have

## Of the Dissolution

a double Completion ; the first in the Destruction of *Jerusalem* and the *Jewish* Polity: In Reference to which it is truly said, *This Generation shall not pass away till all these things be fulfilled.* The second in the final Dissolution of the World, which is yet to come.

BUT to proceed ; Another Place which is usually understood of the Dissolution of the World by Fire, is 2 *Thess.* i. 7, 8. *When the LORD JESUS shall be revealed from Heaven with His mighty Angels in flaming Fire, &c.* Other parallel Places may be seen, *Rev.* vi. 12, 13, 14. *Rev.* x. 6. *Rev.* xxi. 1. *And I saw a new Heaven and a new Earth, for the first Heaven and the first Earth were passed away, and there was no more Sea,* *Hebr.* xii. 26, 27. These Places speak more directly of the Dissolution of the World, and the Coming of CHRIST to Judgment. Others there are, that speak only concerning the Time of it; 1 *Pet.* iv. 7. *But the End of all Things is at hand.* James v. 9. *Behold the Judge standeth before the Door.* 1 *John* ii. 18. *Little Children, it is the last time ;* or as some translate it, the last Hour, ἐσχάτη ὥρα. *Hebr.* x. 37. *Yet a little while, and He that shall come will come, and will not tarry,* μίαν ὥραν ὅσον ὅσον. *Luke* xviii. 17. *I tell you he will avenge them speedily.* All these Places the forementioned Dr. Hammond still applies to that famous Period of the Destruction of the City, Temple and

and Polity of the *Jews*; only in his Note upon *ἀεὶς ὁ αἰώνος*, that everlasting Destruction mentioned 2 *Thess.* i. 9. he hath some Qualification, saying thus: *Mean while, not excluding the eternal Torments of Hell-fire, which expect all impenitent Sinners that thus fall, but looking particularly on the visible Destruction and Vengeance which seizeth on whole Nations or Multitudes at once in this Life.* And in Conclusion hath left us but one Place in the New Testament, to prove the general Conflagration of the World, viz. 2 *Pet.* vii. 7.

Now, because some have been offended at these Interpretations of his, others have spoken very slightly of them: I shall briefly sum up what hath been alledged in Defence of them by this great Man.

1. THAT the Prophets use to set down their Predictions in Tropes and Figures, and not in plain Expressions, (*their Style being Poetical.*) And therefore, in describing those hideous Judgments which fell upon that People of the *Jews*, beyond all that ever before fell upon them, or indeed any other People, they found it necessary to employ those High and Tragical Phrases of the passing away and dissolving Heaven, and Earth, and Elements. And that this was the Manner of the Prophets, may be proved; because we find the Destruction of other Places described in as high Strains, as lofty and tragical Expressions

sions as this of *Jerusalem*. For Example, that of *Idumæa*, *Isa.* xxxiv. 9. *The Streams thereof shall be turned into Pitch, and the Dust thereof into Brimstone, and the Land thereof shall become burning Pitch. It shall not be quenched Night nor Day, the Smoke thereof shall go up for ever.* And in the 4th Verse he seems but to preface to this Destruction, in these Words; *And all the Host of Heaven shall be dissolved, and the Heavens shall be rolled together as a Scroll; and all their Hosts shall fall down as the Leaf falleth off from the Vine, and as a falling Fig from the Fig-Tree; for my Sword shall be bathed in Heaven: Behold it shall come down upon Idumæa.* And in the Burden of *Babylon*, cap. xiii. 8, 9. we have these Words, *Behold the Day of the LORD cometh, cruel both with Wrath and fierce Anger to lay the Land desolate: For the Stars of Heaven, and the Constellations thereof shall not give their Light: The Sun shall be darkened in his going forth, and the Moon shall not cause her Light to shine.*

2. ALL the Predictions in that famous Place, *Matth.* xxiv. to which all other Places in the New Testament relating to this Matter are parallel, are by our Saviour Himself restrained to the Destruction of *Jerusalem*, and the full Completion of them limited to the Duration of that Age: Verse 34. *Verily I say unto you, This Generation shall not pass till all*

all these Things be fulfilled. What Reason then can we have to extend them farther?

3. IN most of the Places where this Coming of CHRIST is mentioned, it is spoken of as near, and at hand; as in the Places last cited. Now, (saith the learned Doctor) in his Note upon *Luke* xviii. 7. *I tell you he will avenge them speedily.* 'All which, if (when 'it is said to approach and to be at the door) 'it belonged to the Day of Judgment (now 'after so many hundred Years not yet come) 'what a *μακροθυμία* were this? What a Delaying of His Coming? And consequently, 'What an Objection against the Truth of the 'Christian Religion? As *Mahomet*, having 'promised after his Death he would presently 'return to Life, and having not performed his 'Promise in a thousand Years, is by us justly 'condemned as an Impostor.

4. THAT this Place of *S. Peter*, out of which I have taken my Text, doth not belong to the End of the World, sufficiently appears (saith he) by the Purport of this whole Epistle, which is to arm them with Constancy and Perseverance till that Day come, and particularly in this Chapter to confute them who object against the Truth of CHRIST's Predictions, and resolve it should not come at all; against whom he here opposes the Certainty, the Speediness, and the Terribleness of its Coming. And for that other famous Place, *2 Thess.* i. 8, 9. that it belongs

belongs to the same Period. See how he makes it out in his Annotations.

I SHALL NOW superadd some Places out of the Old Testament, which seem to speak of the Dissolution of the World, *Job xiv. 12. Man lieth down and riseth not till the Heavens be no more. Psal. cii. 5, 6. quoted Hebr. i. 10, 11. Of old hast thou laid the Foundations of the Earth, and the Heavens are the Works of Thy Hands. They shall perish, but Thou remainest; and they all shall wax old as doth a Garment, and as a Vesture shalt Thou change them, and they shall be changed, Isai. xxxiv. 4. And all the Host of Heaven shall be dissolved, and the Heavens shall be rolled together as a Scroll, and all their Host shall fall down as a Leaf falleth from the Vine, &c. Isai. li. 6. The Heavens shall vanish away like Smoke, and the Earth shall wax old like a Garment, Joel ii. 3. 1. The Sun shall be turned into Darknes, and the Moon into Blood, before that great and terrible Day of the LORD comes. Malachi iv. 1. Behold the Day cometh that shall burn like an Oven, &c. Deut. xxxii. 22. For a Fire is kindled in my Anger, and shall burn to the lowest Hell, and shall consume the Earth with her Increase, and set on Fire the Foundations of the Mountains.* I must confess, that the Prophetick Books are full of Figurative Expressions, being written in a Poetick Style, and according to the Strain of the Oriental Rhetorick, which is much different from the

the *European*, affecting lofty and tumid Metaphors, and excessive *Hyperbola's* and *Aggravations*, which would either sound harsh to our Ears, or import a great deal more to us than they did to them. This is obvious to any one that reads their Books; and may clearly be demonstrated from the Titles that their Kings assumed to themselves, as well anciently as lately, viz. *Sons of the Sun, Brethren of the Sun and Moon, Partners of the Stars, Lions crowned in the Throne of the World, endued with the Strength of the whole Heaven, and Virtue of the Firmament.* Now, we cannot possibly imagine them so vain, as to think themselves literally to be such: No sure, all they meant by these Expressions, was, that they were great, and honourable, and powerful. Now, the Prophetic Books of the Old Testament being written in a Style somewhat conformable to the Oratory of those Countries, are not (I humbly conceive) in every Tittle to be so exactly scanned and literally expounded; but so to be interpreted, as a *Jew* or an *Asiatick* would then have understood them. And this I rather think, because there be divers Passages in the Prophets, which cannot be verified in a strict literal Sense; as in the Place before quoted, *Isa. xxxiv. 9.* it is said of the *Streams of Idumæa*, that they should be turned into Pitch; and the Dust thereof into Brimstone; and the Land thereof should become burning Pitch,  
and

and should not be quenched Night nor Day ; but the Smoke thereof should go up for ever. And of the City of Tyre it is said, *Ezek. xxvi. 14.* It shall be built no more. And *ver. 19.* When I shall make thee a desolate City, like the Cities that are not inhabited, when I shall bring up the Deep upon thee, and great Waters shall cover thee. And *Verse 21.* which is thrice repeated, I will make thee a Terror, and thou shalt be no more ; though thou be sought for, thou shalt never be found again, saith the LORD GOD. And yet we see that the City of Tyre, tho' it was indeed wholly dispeopled at that Time, the Inhabitants transferring themselves into *Africa*, when it was besieged by *Nebuchadnezzar* ; yet was it afterward peopled again, and continues a City inhabited to this Day. And of *Babylon*, it is said, that there should none remain in it, neither Man nor Beast, but that it should be desolate for ever, *Jer. li. 62.* *Isai. xiii. 20.* and of the Land of *Babylon*, *v. 29.* that it should be a Desolation without an Inhabitant. And though indeed this Prophecy was, I think, as to the City, at last verified in the Letter ; yet did *Babylon* long continue a great City after this Prophecy : And the Land of *Babylon* is now inhabited, there being at this Day a great City not far from the Place where *Babylon* stood. So that these Places import no more, than that there should be a very great Destruction and Devastation of




of those Cities and Countries. As for those Places in the Old and New Testament, where in Mention is made of the last Days and the last Times, it is clear that they are to be understood of the Age of the Messiah, all the time from the Exhibition of the Messiah to the End of the World. *Isaiah ii. 1. And it shall come to pass in the last Days, that the Mountain of the LORD's House shall be established in the Top of the Mountains, and shall be exalted above the Hills, and all Nations shall flow to it;* which very Words we have repeated *Micah iv. 1. So in that Prophecy of Joel ii. 28. quoted Acts ii. 17. And it shall come to pass in the last Days, saith GOD, I will pour out of my Spirit upon all Flesh, &c.* it is clear the last Days are to be understood. The Apostle *Peter* interpreting the Prophecy, (*ver. 16.*) of the Gift of Tongues bestowed upon the Disciples at that time. Hence the last Days have among the Jews proverbially signified the Days of the Messiah, as Doctor *Hammond* in his Annotations upon this Place tells us; who also notes, that in that Place of *Joel*, the last Days do literally signify the last Days of the Jews, immediately preceding their Destruction, called there the great and terrible Day of the LORD. So *Hebr. i. 2.* by ἐν ἑσχατῶν τῶν ἡμερῶν τούτων, in these last Days, is meant the Days of the Messiah. So *1 Pet. i. 20. 2 Pet. iii. 3. 1 Tim. iv. 1. 2 Tim. iii. 1.* Mention is made of

of the last Days in this Sense. In like manner, the End of the World, συντέλεια τῶν αἰώνων, Heb. ix. 26. But now once in the End of the World hath He appeared to put away Sin by the Sacrifice of Himself. And τὰ τέλη τῶν αἰώνων, the Ends of the World, in 1 Cor. x. 11. upon whom the Ends of the World are come, signify the Age of the Messias, though indeed the former seems more peculiarly to denote the Shutting up of the Jewish Age or OEconomy.



### C H A P. III.

*The Testimonies of the Ancient Fathers and Doctors of the Church, concerning the Dissolution of the World.*

2.  PROCEED now to what the Ancient Fathers of the Church and Christian Writers have delivered concerning the Dissolution of the World.

THAT there should be a Dissolution of this World, and that it shall be by Fire, is so certain and clear among them, that it would be superfluous to cite Particulars to prove it: Nay, so general and unanimous is the Consent of all Christians in this Point, that, as Ori-  
gen

gen observes in his third *περὶ Ἀρχῶν*, and the learned Doctor *Hakewill* after him, whereas there can hardly be named any Article of our Faith, which some Hereticks have not presumed to impugn or call in Question, yet not any to be met with who question this; but herein all agree, being compelled (saith *Origen*) by the Authority of the Scriptures. As for the Time of this Dissolution, the ancient Christians held it to be at hand, as might easily be proved by many Testimonies, were it not granted on all Hands. And here it may be worth the observing, that the longer the World stood, the farther off generally have Christians set the Day of Judgment, and End of it. Many of the Ancients did conceive, that the Dissolution should be at the End of six thousand Years. As for Example, *Justin Martyr*, in *Quæst. & Resp. ad Orthodoxos*, if he be the Author of that Piece, where this Question (*When the End of the World should be?*) being put, the Answer is, Ἐνεστὶ διὰ πολλῶν γραφικῶν μαρτυριῶν, &c. *We may rationally conjecture and conclude from many Scripture Expressions, that they are in the right, who say that the World will last six thousand Years. For in one Place it saith, In these last Days; and in another, Upon whom the Ends of the World are come; and in a third, When the Fulness of Time was come. Now it is evi-*

Y

dent,

dent that these things were spoken in the sixth Millenary.

IRENÆUS *adv. hæres. lib. 5. cap. ult.* who gathers so much from the Similitude of the six Days Creation, after which six Days was the Sabbath, that is, the Day of Rest; *Hoc autem* (saith he) *est & præteritorum narratio, & futurorum prophetia. Dies enim unus mille annos significabat, sicut Scriptura testatur*; \* *Mille anni ante Dominum sicut Dies unus*: ergo sicut consummatus fuit mundus in sui creatione intra sex dierum spatium, & postea quies; sic in sui fine consummabitur intra spatium sex millium annorum, deinde vera & perpetua quies subsequetur. This is both a Narration or History of what is past, and a Prophecy of Things to come. For one Day signified a thousand Years, as the Scriptures testify, A thousand Years in the Sight of God are but as one Day. Therefore, as the World at the first Creation was consummated in the Space of six Days, and afterwards followed the Sabbath or Rest; so, in the end, its Duration shall be consummated within the Space of Six thousand Years; and then shall follow the true and perpetual Rest.

To these I might add *Lactantius*, in his Seventh Book of *Institut. cap. 14.* who useth the same Argument with *Irenæus*, *Ergo quoniam sex diebus cuncta Dei opera perfecta sunt: per secula sex, id est, sex annorum millia manere in hoc statu mundum necesse est.*  
Dies

*Dies enim magnus Dei mille annorum circulo terminatur, sicut indicat Propheta, qui dicit, Ante oculos tuos, Domine, mille anni tanquam dies unus, &c. Therefore, because all the Works of GOD were perfected (or finished) in six Days; it is necessary (or necessarily follows) that the World shall continue in this State six Ages; that is, Six thousand Years. For, the great Day of GOD is terminated in a Circle of Six thousand Years; as the Prophet intimates, who saith, A thousand Years in Thy Sight, O LORD, are but as one Day. S. Augustin, l. 20. de Civitate Dei. S. Hieronymus Comment. in Mich. cap. 4. Most clear and full to this purpose is Eustath. in his Comment. in Hexaëmeron, Λογίζομεθα γὰρ διαμεῖναι τὴν κτίσιν, &c. We reckon (saith he) that the Creation shall continue till the End of the sixth Chiliad, because GOD also consummated the Universe in six Days; and, I suppose, that the Deity doth account Days of a thousand Years long; for that it is said, A thousand Years are in the Sight of the LORD as one Day. Howbeit, the most of them did not propose this Opinion as an undoubted Truth, but only as a modest Conjecture. And S. Austin is very angry with them, who would peremptorily conclude from so slight an Argumentation.*

*This Conceit is already confuted, and the World hath long outlasted this Term, according to their Computation who followed the Septuagint or Greek Account, and reckoned*

that *Phaleg* lived about the Three thousandth Year of the World, and had his Name from his living in the Division of Time, there being to come after him Three thousand Years, that is, just so many as were past before him.

As concerning the future Condition of the World after the Conflagration, I find it the general and received Opinion of the ancient Christians, that this World shall not be annihilated or destroyed, but only renewed and purified. So *Eusebius*, Οὐ παντελῶς πρὸς φθορὰν ὁ κόσμος χωρήσει, ἀλλὰ πρὸς ἀνακαινισμόν. *The World shall not be wholly destroyed, but renewed.* Divers other Passages I might produce out of him to the same purpose: *Cyril of Jerusalem*, Catech. 15. Εἰλίσσει ὃ τὰς ἑρμῆς, ἐκ ἵνα ἀπολέσῃ τὰς, ἀλλ' ἵνα καλλίονας ἐγείρῃ. *He folds up the Heavens, not that he might destroy them, but that he might rear them up again more beautiful.* Again, *Cyril* upon this Place, Θάνατον δὲ τῶν στοιχείων εὐφρῶς ὀνομάζει τὴν εἰς τὰ ἀμείνω μεταβολήν, &c. *He acutely or ingeniously calls the Death of the Elements their Change into better.* So that this Renovation in respect of the Creation, shall be such a kind of thing as the Resurrection in reference to Man's Body. *OEcumenius*, upon this Place, He saith, *new Heavens, and a new Earth*, ἐν ἐτέραν δὲ τῇ ὕλῃ, yet not different in Matter. And again, ἐκ εἰς ἀφανισμόν ἀλλ' εἰς κάθαρσιν. *They*

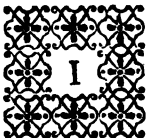
They shall not be destroyed or annihilated, but only renewed and purified. And upon Rev. xxi. 2. Τὸτο ἡ τὴν ἀνυπαρξίαν δηλῶν τῆς κτίσεως, ἀλλὰ τὸν ἀνακαινισμόν. This he saith, not denoting the Non-existence of the Creation, but the Renewing. In this manner he expounds Psalm cii. 5, 6. and proceeding, saith, We may here take Notice, that the Apostle doth not use the Word ἀπῆλθεν, as if the Heaven and Earth were annihilated and brought to nothing; but μετέβη, they passed away, or removed, or changed State. S. Hierome upon the Psalms, Psalm cii. saith, Ex quo ostenditur perditionem calorum non interitum sonare, sed mutationem in melius. From which Words [as a Vesture shalt thou change them] may be shewn and made out, that the Dissolution of the Heavens doth not signify their utter Destruction or Annihilation, but only their Change into a better State. I might add abundance more Testimonies, but these, I think, may suffice.





## C H A P. IV.

### *The Opinions of the Ancient Heathen Philosophers, and other Writers concerning the Dissolution.*

3.  T follows now that I give you an Account what the ancient Philosophers and Sages among the *Heathens* thought and delivered concerning this Point. Two of the four principal Sects of Philosophers held a future Dissolution of the World, viz. The *Epicureans* and *Stoicks*.

As for the *Epicureans*, they held, that as the World was at first composed by the fortuitous Concourse of Atoms, so it should at last fall in Pieces again by their fortuitous Separation, as *Lucretius* hath it, *lib. 5.*

*Principio maria ac terras cœlumque tuere,  
Horum naturam triplicem, tria corpora, Memmi,  
Tres species tam dissimiles, tria talia texta  
Una dies dabit exitio, multosque per annos  
Sustentata ruet moles & machina mundi.*

But now to prove all this ; first cast an Eye, }  
And look on all below, on all on high, }  
The solid Earth, the Seas, and arched Sky : }  
One fatal hour at last must ruin all,  
This glorious Frame, that stood so long, must fall.

This



This Opinion of theirs is consonant enough to their wild Principles, save only in that Point of its Suddenness, *Una dies dabit exitio, &c. One day shall destroy or make an end of it.*

THE *Stoicks* were also of Opinion, that the World must be dissolved, as we may learn from the Seventh Book of *Laertius*, in the Life of *Zeno*, 'Απέσκει δ' αὐτοῖς, &c. They hold, that the World is corruptible for these Reasons; 1. Because it was generated, and had a Beginning. 2. Because That is corruptible in the whole, whose Parts are corruptible; But the Parts of the World are corruptible, being daily transmuted one into another. 3. That which is capable of Mutation, from better to worse, is corruptible. But such is the World; sometimes being afflicted with long Heats and Droughts, sometimes with continued Showers and Inundations. To these we may add, 4. according to some of their Opinions, Because the Sun and Stars being fed with Vapours exhaled from the Earth, all the Moisture will at length be drawn out, and the World fly on fire. They were afraid, \* *Nè humore omni* \* Minut. consumpto totus mundus ignesceret. The Poet Felix. *Lucan*, who seems to be of the *Stoick* Sect, in the Beginning of his First Book, describing the Dissolution of the World, makes it to be a Falling in Pieces of the whole Frame of  
Y 4 Heaven

# Of the Dissolution

Heaven and Earth, and a Jumbling and Confounding of all their Parts together.

----- *Sic cum compage solutâ  
Secula tot mundi suprema coëgerit hora ;  
Antiquum repetent iterum Chaos omnia ; mistis  
Sydera syderibus concurrent ; ignea Pontum  
Astra petent, tellus extendere littora nolet,  
Excutiêtque fretum ; fratri contraria Phoebe  
Ibit, & obliquum bigas agitare per orbem  
Indignata diem poscet sibi ; totaque discors  
Machina divulsi turbabit fœdera mundi.*

----- *So when the last Hour shall  
So many Ages end, and this disjointed, All  
To Chaos back return ; then all the Stars shall be  
Blended together ; then those burning Lights  
on high  
In Sea shall drench ; Earth then her Shores  
shall not extend,  
But to the Waves give Way ; the Moon her  
Course shall bend  
Cross to her Brothers, and disdaining still to  
drive  
Her Chariot Wheel athwart the heavenly Orb,  
shall strive  
To rule the Day ; this Frame to Discord bent,  
The World's Peace shall disturb, and all in  
sunder rent.*

This Dissolution of the World, they held, should be by Water and by Fire alternately at certain Periods, but especially by Fire, which

which they call ἐκπύρωσιν. Philo, Οἱ δὲ Στωϊκοὶ τῆς φθορᾶς τῷ κόσμῳ αἰτίαν φασὶ τὴν ὑπάρχουσαν ἐν τοῖς ἔσοι πυρὸς ἀκαμάτε, δύναμιν, χερῶν μακραῖς περιόδοις ἀναλυσαν τὰ πάντα εἰς ἑαυτὸν. The Stoicks say, that the Cause of the Destruction of the World is the irresistible Force of Fire that is in things, which, in long Periods of Time, consumes and dissolves all things into itself. Euseb. Præp. l. 15.

Ἀρέσκει ὃ τοῖς πρεσβυτάτοις τῶν ἀπὸ τῆς αἵρεσεως, ἐξαερῶσαι πάντα κατὰ περιόδους τινὰς μεγίστας, εἰς πῦρ αἰθερώδες ἀναλυομένων πάντων. The most ancient of that Sect held, That at certain vast Periods of Time all things were rarified into Air, being resolved into an Ethereal Fire. This Ἐκπύρωσις of the Stoicks we find mentioned by many, both Christian and Heathen Writers, as besides the fore-quoted Minutius Felix, Justin Martyr, Clemens Alexandrinus in 5. Strom. Plutarch, Seneca, and others. The Time of this Conflagration Seneca determines not, but saith only, it shall be when God pleases. 3 Quæst. Nat. cap. 20. 8. Cum Deo visum, vetera finire, ordiri meliora; When it shall seem good to God to put an End to old things, and to begin better. Some there be who tell us of the Annus Platonicus or Magnus, by which they understand such a Period of Time, as in which all the heavenly Bodies shall be restored to the same Site and Distance they were once in, in respect of one another: As supposing that all the Seven Planets

nets were at the Moment of Creation in the first Degree of *Aries*, till they come all to be in the same Degree again; all that Space of Time is called the Great Year, *Annus Magnus*. In this Year they tell us, that the Height of Summer is the Conflagration, and the Depth of Winter the Inundation; and some Astrologers have been so vain as to assign the Time both of the Inundation and Conflagration. *Seneca*, 3 *Quæst. Nat. cap. 20. Berosus, qui Belum interpretatus est, dicit, cursu ista syderum fieri, & adeò quidem affirmat, ut conflagrationi atque diluvio tempus assignet. Arsuræ enim terrena contendit, quando omnia sydera in Cancro convenerint: inundationem futuram, quando eadem syderum turba in Capricorno convenerit. Berosus, who interpreted Belus, saith, That those things come to pass according to the Course of the Stars: and he so confidently affirms it, that he assigns the Time both for the Conflagration and Inundation. For that all earthly Bodies will be burnt up, when all the Stars shall meet in Cancer; and the Inundation will fall out, when the same shall be in Conjunction in Capricorn.* Concerning the Manner of this Conflagration, they held it should be sudden. *Senec. Natura subito ad ruinam, & toto impetu ruit; licet ad originem parçè utatur viribus, dispensètque se incrementis fallacibus. Momento fit cinis, diu sylva, &c.* Nature doth suddenly, and with all its Force, rush on to Ruin; though, to the Rise and For-

mation

nation of Things, it useth its Strength sparingly, dispensing its Influence, and causing them to grow by insensible Degrees; a Wood is long in growing up, but reduced to Ashes almost in a Moment. And some of them were so absurd as to think, that the Stars should jostle and be dashed one against another. *Senec. lib. de consolatione ad Marciam: Cum tempus advenerit, quo se mundus revocaturus extinguat, viribus ista se suis cedent; & sydera syderibus incurrent; & omni flagrante materia, uno igne, quicquid nunc ex disposito luget, ardebit.* When the Time shall come, that the World, again to restore and renew itself, shall perish, these things shall batter and maul themselves by their own Strength, the Stars shall run or fall foul upon one another, and all the Matter flaming, whatsoever now, according to its settled Order and Disposition, shines, shall then burn in one Fire. Here, by the way, we may, with Dr. More, [*Soul's Immortality, lib. 3. cap. 18.*] take notice, how coarsely, not to say ridiculously, the Stoicks philosophize, when they are turned out of their Road-way of Moral Sentences, and pretend to give an Account of the Nature of Things. For, what Errors can be more gross than they entertain of God, of the Soul, and of the Stars? they making the two former corporeal Substances, and feeding the latter with the Vapours of the Earth; affirming that the Sun sips the Water of the great

‘ great Ocean to quench his Thirst, but that  
 ‘ the Moon drinks off the lesser Rivers and  
 ‘ Brooks; which is as true as that the *Ass*  
 ‘ drank up the *Moon*. Such Conceits are  
 ‘ more fit for *Anacreon* in a drunken Fitt to  
 ‘ stumble upon, who, to invite his Compa-  
 ‘ nions to tipple, composed that Catch,

Πίνει θάλασσα δ’ αὔρας,  
 ‘Ο δ’ ἥλιος θάλασσαν.

*The Sea drinks up the Vapours,  
 And the Sun the Sea.*

‘ than to be either found out or owned by a  
 ‘ serious Philosopher. And yet *Seneca* might-  
 ‘ tily triumphs in this Notion, of foddering  
 ‘ the Stars with the thick Fogs of the Earth,  
 ‘ and declares his Opinion with no mean  
 ‘ Strains of Eloquence, &c.

‘ As for the Extent of this Conflagration,  
 they held, that not only the Heavens should  
 be burnt, but that the Gods themselves  
 should not escape Scot-free. So *Seneca*, *Re-*  
*solutio mundo, & Diis in unum confusis*. *When*  
*the World shall be dissolved, and the Gods*  
*confounded and blended together into one.* And  
 again, *Atque omnes pariter Deos perdet nos*  
*aliqua & Chaos*. And, in like manner, a certain  
*Night and Chaos shall destroy all the Gods.*  
 Is not this wise Philosophy? If their Morali-  
 ty were no better than their Physicks, their  
*Wise Man* they boast of, might be so deno-  
 minated, κατ’ ἀντιφρασιν, as they of *Gotham*.

BUT

BUT let us look a little farther, and we shall find, that the *Stoicks* were not the first Authors of this Opinion of the Conflagration; but that it was of far greater Antiquity than that Sect. Others of the more ancient Philosophers having entertained it, viz. *Empedocles*, as *Clemens Alexandrinus* testifies in his 5 *Strom.* Ὡς ἐσομένης ποτὲ εἰς τὴν τῆ πυρὸς ἐσὶαν μεταβολῆς. That there shall some time be a Change of the World into the Nature or Substance of Fire. 2. *Heraclitus*, as the same *Clemens* shews at large out of him in the same place, ὅπως ὁ πάλιν ἀναλαμβάνεται καὶ ἐκπυρῆται, &c. And *Laertius*, in the Life of *Heraclitus*, he taught, Ἐνα εἶναι τὸν κόσμον, γενῆσθαι τε αὐτὸν ἐκ πυρὸς, καὶ πάλιν ἐκπυρῆσθαι κατὰ τινὰς περιόδους ἐναλλάξ τὸν σὺμπαντα αἰῶνα. That there is but one World, and that it was generated out of Fire, and again burnt up or turned into Fire, at certain Periods alternately throughout all Ages. I might add to these the Ancient Greek Poets, *Sophocles* and *Diphilus*, as we find them quoted by *Justin Martyr*; and *Clemens Alexandrinus*. Neither yet were these the first Inventers and Broachers of this Opinion, but they received it by Tradition from their Forefathers; and look'd upon it as an Oracle and Decree of Fate. *Ovid* speaks of it as such, in the First of his *Metamorphosis*:

Esse

*Esse quoque in fatis reminiscitur, affore tempus,  
Quo mare, quo tellus, correptaque regia cæli  
Ardeat, & mundi moles operosa laboret.*

----- Besides by Doom.

*Of certain Fate, he knew the Time should  
come,  
When Sea, Earth, ravish'd Heav'n, the curi-  
ous Frame  
Of this World's Mass should shrink in purging  
Flame.*

\* Lib. 7. And *Lucan* \*;

*Hos Cæsar, populos si nunc non usserit ignis,  
Uret cum terris, uret cum gurgite ponti:  
Communis mundo superest rogos ossibus Astra  
Misturus. -----*

*If now these Bodies want their Fire and Urn,  
At last with the whole Globe they'll surely burn;  
The World expects one general Fire: And thou  
Must go where these poor Souls are wandring  
now.*

Now, though some are of Opinion, that by  
*Fata* here are to be understood the *Sibylline*  
*Oracles*, and to that Purpose do alledge some  
Verses out of those extant under that Title,  
as *Lactantius*, in his Book *De ira Dei*, cap. 23.

*Καί ποτε τὴν ὀργὴν Θεὸν ἐκέτι πράϋνοντα,  
'Αλλ' ἐξεμβρίθοντα, καὶ ἐξολύοντά τε γένναν  
'Ανθρώπων ἅπασαν ὑπ' ἐμπρησμῷ πέρθοντα.*

*And*



And it shall some time be, that God not any more mitigating His Anger, but aggravating it, shall destroy the whole Race of Mankind, consuming it by a Conflagration.

And in another Place there is Mention made, of a River of Fire that shall descend from Heaven, and burn up both Earth and Sea.

*Tunc ardens fluvius cælo manabit ab alto  
Igneus, atque locos consumet funditus omnes,  
Terrâinque, Oceanumque ingentem, & cæcula  
ponti,*

*Stagnaque, tum fluvios, fontes, Ditemque se-  
verum,*

*Cælestemque polum, cæli quoque lumina in u-  
num*

*Fluxa ruent, formâ deletâ prorsus eorum,  
Astra cadent, etenim de cælo cuncta revulsa.*

Then shall a burning Flood flow from the  
Heav'ns on high,

And with its fiery Streams all Places utterly  
Destroy, Earth, Ocean, Lakes, Rivers, Foun-  
tains, Hell,

And heav'nly Poles, the Lights in Firmament  
that dwell,

Losing their beauteous Form shall be obscur'd,  
and all

Raught from their Places, down from Heav'n  
to Earth shall fall.

Now

Now because the Verses now extant under the Name of *Sibylline Oracles* are all suspected to be false and *Pseudepigrapha*; and many of them may be demonstrated to be of no greater Antiquity than the Emperor *Antoninus Pius* his Reign; and because it cannot be proved, that there was any such thing in the Ancient genuine *Sibylline Oracles*; I rather think, (as I said before) that it was a Doctrine of ancient Tradition, handed down from the first Fathers and Patriarchs of the World. *Josephus*, in his *Antiquities*, runs it up as high as *Adam*, from whom *Seth* his Son received it; his Father, saith he, foretelling him, ἀφανισμόν τῶν ὅλων ἔσεσθαι, τὸν μὲν κατὰ ἰσχὺν πυρὸς, τὸν δὲ κατὰ βίαν καὶ πλῆθος ὕδατος. That there should be a Destruction of the Universe, once by the Violence of Fire, and again by the Force and Abundance of Water; in Consequence whereof he erected two Pillars, one of Brick, which might endure the Fire, and another of Stone, which would resist the Water; and upon them engraved his Astronomical Observations, that so they might remain to Posterity: And one of these Pillars, he saith, continued in *Syria* until his Days. Whether this Relation be true or not, it may be thence collected, that this was an universal Opinion, received by Tradition, both among *Jews* and *Gentiles*, That the World should one Day be consumed by Fire. It may be proved by good Authority, that

the

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the ancient *Gauls*, *Chaldeans*, and *Indians*, had this Tradition among them ; which they could not receive from the *Greek* Philosophers or Poets, with whom they had no Intercourse ; but it must, in all Probability, be derived down to both from the same Fountain and Original ; that is, from the first Restorers of Mankind, *Noah*, and his Sons.

I NOW proceed to the Third Particular proposed in the Beginning ; that is, to give Answer to the several Questions concerning the Dissolution of the World.



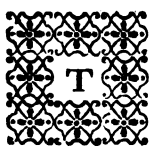


## C H A P. V.

*The first Question concerning the World's Dissolution, Whether there be any thing in Nature that may probably cause or argue a future Dissolution? Three probable Means propounded and discussed.*

### S E C T. I.

*The Waters again naturally overflowing and covering the Earth.*

 H E first Question is, Whether there be any thing in Nature, which may prove and demonstrate, or probably argue and infer a future Dissolution? To which I answer, That I think there is nothing in Nature which doth necessarily demonstrate a future Dissolution: But that Position of the Peripatetick Schools may, for ought I know, be true Philosophy; *Posito ordinario Dei concursu mundus posset durare in aeternum.* Supposing the ordinary Concourse of God [with second Causes] the World might endure for ever. But though a future Dissolution by Natural Causes, be not demonstrable; yet  
some

some possible, if not probable; Accidents there are, which, if they should happen, might inferr such a Dissolution. Those are Four: The Possibility of

1. THE Waters again overflowing and covering the Earth.

2. THE Extinction of the Sun.

3. THE Eruption of the *Central Fire* enclosed in the Earth.

4. THE Driness and Inflammability of the Earth under the Torrid Zone, and the Eruption of all the *Vulcano's* at once.

BUT before I treat of these, it will not be amiss, a little to consider the old Argument for the World's Dissolution, and that is, its daily Consenescence and Decay; which, if it can be proved, will in Process of time necessarily inferr a Dissolution. For as the Apostle saith in another Case, *That which decayeth and waxeth old is ready to vanish away*, Heb. viii. 13. That which continually wastes, will at last be quite consumed; that which daily grows weaker and weaker, will in time lose all its Force. So the Age, and Stature, and Strength of Man, and all other Animals, every Generation decreasing, they will in the End come to nothing. And that all these and all other things do successively diminish and decay in all Natural Perfections and Qualities, as well as Moral, hath been the received Opinion, not only of the Vulgar, but even of Philosophers themselves from Antiquity down to our

## Of the Dissolution

Times. Plin. Nat. Hist. l. 7. c. 16. *In plenum autem cuncto mortalium generi minorem indies mensuram stature propemodum observatur: rarosque patribus proceriores consumente ubertatem seminum exustione; in cujus vices nunc vergat ævum.* In sum; It is observed, that the Measure of the Stature of all Mankind decreases and grows less daily: And that there are few taller than their Parents; the Burning (to which the Age inclines) consuming the Luxury of the Seeds.

*Terra malos homines nunc educat atque pusillos.*  
Juvenal Sat.

*The Earth now breeds Men bad and small.*

And Gellius, Noct. Att. lib. 3. c. 10. *Et nunc quasi jam mundo senescente rerum atque hominum decrementa sunt.* And now, as if the World waxed old, there is a Decrement or Decay both of Things and Men. I might accumulate Places out of the Ancients and Moderns to this Purpose, but that hath been already done by others.

BUT this Opinion, how general soever it was formerly, was inconsiderately, and without sufficient Ground, taken up at first; and afterwards without due Examination embraced and followed, as appears by Dr. Hake-will's *Apology*, wherein it is so fundamentally confuted, that it hath since been rejected by all considerate Persons. For that Author hath

at

at large demonstrated, that neither the pretended Decay of the Heavenly Bodies in regard of Motion, Light, Heat, or Influence; or of any of the Elements; neither the pretended Decay of Animals, and particularly and especially of Mankind, in regard of Age and Duration, of Strength and Stature, of Arts and Wits, of Manners and Conversation, do necessarily infer any Decay in the World, or any Tendency to a Dissolution. For tho' there be at Times great Changes of Weather, as long continuing Droughts, and no less lasting Rains; excessive Floods and Inundations of the Sea; prodigious Tempests and Storms of Thunder, Lightning and Hail; which seem to threaten the Ruin of the World, violent and raging Winds, Spouts and Hurricanes, which turn up the Sea to the very Bottom, and spread it over the Land; formidable and destructive Earthquakes, and furious Eruptions of *Vulcano's* or Burning Mountains, which waste the Country far and wide, overwhelming or subverting great Cities, and burying their Inhabitants in their Ruins, or as the Scripture speaks, *Making of a City a Heap, of a defenced City a Ruin.* Though these and many other Changes do frequently happen, at uncertain Seasons as to us, yet are they so ordered by the wise Providence of the Almighty Creator and Governour of the World, as nearly to balance one another,

and to keep all things in an *Æquilibrium* ; so that as it is said of the Sea, that *what it gains in one Place, it loses in another*, it may be said proportionably of the other Elements and Meteors; That, for Example, a long Drought in one Place is compensated probably at the same time by as long a Rain in another; and at another time, the Scene being changed, by as durable a Drought in this, as lasting a Rain in that. The same may be said of violent and continuing Heats and Colds in several Places, that they have the like Vicissitudes and Changes, whereby in the whole they so balance and counterpoise one another, that neither prevails over other, but continue and carry on the World as surely and steddily, as if there were no such Contrarieties and Fights, no such Tumults and Commotions among them. The only Objection against this Opinion, is the Longævity of the *Antediluvian* Patriarchs, and of some also (I mean the first) of the *Postdiluvian*. For immediately after the Flood, the Age of Man did gradually decrease every Generation in great Proportions; so that had it continued so to do at that Rate, the Life of Man had soon come to nothing. Why it should at last settle at Threescore and ten Years, as a mean Term; and there continue so many Ages, without any farther Change and Diminution, is, I confess, a Mystery too hard for me to reveal: However, there must be  
a great



a great and extraordinary Change at the Time of the Flood, either in the Temperature of the Air, or Quality of the Flood, or in the Temper and Constitution of the Body of Man, which induced this Decrement of Age. That the Temper and Constitution of the Bodies of the *Antediluvians* was more firm and durable than that of their Posterity after the Flood: And that this Change of Term of Life was not wholly to be attributed to Miracle, may both be demonstrated from the gradual Decrease of the Age of the *Postdiluvians*. For had it been miraculous, why should not the Age of the very first Generation after the Flood have been reduced to that Term? And what Account can we give of their holding out for some Generations against the Inconveniencies of the Air, or Deteriority of Diet, but the Strength and Firmness of their Constitutions? which yet was originally owing to the Temperature of the Air, or Quality of their Diet, or both; seeing a Change in these (for there was no other visible Cause) did by Degrees prevail against, and impair it. What Influence the lying so long of the Water upon the Earth might have upon the Air and Earth, in changing them for the worse, and rendring them more unfit for the Maintenance and Continuance of Humane Life, I will not now dispute. But whatever might be the Cause of the Longævity of the

*Antediluvians*, and the Contracting of the Age of the *Postdiluvians*, it is manifest, that the Age of these did at the last settle, as I said, at or about the Term of Threescore and ten, and hath there continued for Three thousand Years without any Diminution.

I PROCEED now to the Accidents which might possibly, in Process of Time, inferr a Dissolution of the World.

I. THE Possibility of the Water, in Process of Time, again overflowing and covering of the Earth.

FOR, first of all, the Rains continually washing down and carrying away Earth from the Mountains, it is necessary, that as well the Height as the Bulk of them that are not wholly rocky, should answerably decrease; and that they do so, is evident in Experience. For, as I have elsewhere noted, I have been informed by a Gentleman of good Credit, that whereas the Steeple of *Craich*, in the Peak of *Derbyshire*, in the Memory of some old Men then living [1672.] could not have been seen from a certain Hill lying between *Hopton* and *Wirksworth*, now not only the Steeple, but a great Part of the Body of the Church may from thence be seen; which comes to pass by the Sinking of a Hill between the Church and the Place of View: A parallel Example whereto the learned Dr. Plot gives us, in a Hill between *Sibbertoft* and *Hasleby* in *Northamptonshire*, Hist. Nat. Stafford,

*Stafford.* p. 113. And thus will they continue to do so long as there falls any Rains, and as they retain any Declivity, that is, till they be leveled with the Plains.

IN Confirmation of this Particular, I have received from my ingenious Friend Mr. *Edward Lhuyd*, some notable Observations of his own making concerning the Mountains of *Wales*; which do demonstrate that not only the looser and the lighter Parts of the Mountains, as Earth, Sand, Gravel, and small Stones, may be washed down by the Rains: But the most solid and bulky Rocks themselves, by the violent Descent of the Waters down their Chinks and Precipices, be in time undermined and subverted. Take them in his own Words:

‘ UPON the reading of your Discourse of  
‘ the Rains continually washing away, and  
‘ carrying down Earth from the Mountains,  
‘ I was put in mind of something pertinent  
‘ thereto, which I have observed in the Mountains of *Caernarvonshire*, viz.

1. FIRST, ‘ That generally the higher the  
‘ Hills are, the more steep are their Precipices and Declivities, (I except the Sea Rocks) thus *Moel y Wydhrba*, y *Grib gôtch*, and twenty others that might be named, reputed the highest Hills in *Wales*, have the steepest Rocks of any Mountains I have seen; and that not only in their highest Cliffs, but also in most of their other Craggs,  
‘ till

‘ till you descend to the lower Valleys: This  
 ‘ I can ascribe to nothing else but the Rains  
 ‘ and Snow which fall on those high Moun-  
 ‘ tains, I think, in ten times the Quantity  
 ‘ they do on the lower Hills and Valleys.

2. ‘ I HAVE observed a considerable Quan-  
 ‘ tity of the Chips or Parings (if I may so  
 ‘ call them) of these Cliffs to lie in vast  
 ‘ Heaps at the Roots of them; and these  
 ‘ are of several Sorts and Materials; being  
 ‘ in some Places covered with Grass, and in  
 ‘ others as bare as the Sea Shore: And those  
 ‘ bare Places do consist sometimes of Gra-  
 ‘ vel, and an innumerable Number of Rock  
 ‘ Fragments, from a Pound Weight to twen-  
 ‘ ty, &c. and are sometimes composed of  
 ‘ huge Stones, from an hundred Pound  
 ‘ Weight to several Tuns.

3. ‘ IN the Valleys of *Lbanberys* and *Nant-  
 ‘ Phrancon*, the People find it necessary to  
 ‘ rid their Grounds often of the Stones  
 ‘ which the Mountain Floods bring down;  
 ‘ and yet notwithstanding this Care, they of-  
 ‘ ten lose considerable Parcels of Land.

4. ‘ I AFFIRM, That by this means not  
 ‘ only such Mountains as consist of much  
 ‘ Earth and small Stones, or of softer Rocks,  
 ‘ and such as are more easily dissoluble, are  
 ‘ thus wasted, but also the hardest Rocks in  
 ‘ *Wales*; and they seem to be as weighty,  
 ‘ and of as firm and close a Texture as Mar-  
 ‘ ble itself. It happen’d in the Valley of  
 ‘ *Nant-*

' *Nant-Phrancon*, Anno 1685. that Part of  
 ' a Rock of one of the impendent Cliffs,  
 ' call'd yr *Hysvaë*, became so undermined,  
 ' (doubtless by the continual Rains and sub-  
 ' terraneous Veins of Water occasioned by  
 ' them) that losing its Hold it fell down in  
 ' several Pieces, and in its Passage down a  
 ' steep and craggy Cliff, dislodged thousands  
 ' of other Stones, whereof many were in-  
 ' tercepted e'er they came down to the Val-  
 ' ley, but as much came down as ruin'd a  
 ' small Piece of Ground; and several Stones  
 ' were scatter'd at least 200 Yards asunder.  
 ' In this Accident one great Stone, the big-  
 ' gest remaining Piece of the broken Rock,  
 ' made such a Trench in its Descent, as the  
 ' small Mountain Rills commonly run in;  
 ' and when it came down to the plain  
 ' Ground, it continued its Passage through  
 ' a small Meadow, and a considerable Brook,  
 ' and lodged itself on the other side it.  
 ' From hence I gather, that all the other vast  
 ' Stones that lie in our mountainous Val-  
 ' leys, have by such Accidents as this fallen  
 ' down. Unless perhaps we may do better  
 ' to referr the greatest Part of them to the  
 ' universal Deluge. For considering there  
 ' are some thousands of them in these two  
 ' Valleys [of *Lhanberys* and *Nant-Phran-*  
 ' *con*] whereof (for what I can learn) there  
 ' are but two or three that have fallen in the  
 ' Memory of any Man now living; in the  
 ' ordina-

‘ ordinary Course of Nature we shall be  
 ‘ compelled to allow the rest many thou-  
 ‘ sands of Years more than the Age of the  
 ‘ World.” So far Mr. *Lbryd*.

To this last Particular, and for a farther Account of it, may be added, That sometimes there happen strange and violent Storms and Hurricanes, wherein the Rain is driven with that Force upon the Tops and Sides of the Mountains by furious and tempestuous Winds, as to do more Execution upon them by breaking in Pieces, tearing and throwing down Rocks and Stones, in a few Days, than in the ordinary Course of Nature, by the usual Weather is effected in many hundred Years.

2. By reason of the Abundance of Earth thus washed off the Mountains by Shots of Rain, and carried down with the Floods to the Sea; about the Out-lets of the Rivers, where the violent Motion of the Water ceases, settling to the Bottom, and raising it up by Degrees above the Surface of the Water, the Land continually gains upon, and drives back the Sea: The *Egyptian Pharos*, or Light-House, of old Time stood in an Island a good Distance from Land, which is now joined to the Continent, the interjacent *Fretum* having been filled up by the Silt brought down by the River *Nilus* in the Time of the Flood subsiding there. Indeed, the ancient Historians do truly make the whole Land of *Egypt* to have been δῶρον ποταμῆς, *the Gift of the*

the River, and by this means gained from the Sea. Seneca, in the Sixth Book of his Nat. Quest. chap. 26. gives this Account, *Ægyptus ex limo tota concrevit. Tantum enim (si Homero fides) aberat à continenti Pharos, quantum navis diurno cursu metiri plenis lata velis potest. Sed continenti admotæ est. Turbidus enim defluens Nilus, multumque sæcum limum trahens, & eum subinde apponens prioribus terris, Ægyptum annuo incremento semper ultra tulit. Inde pinguis & limosi soli est, nec ulla intervalla in se habet; sed crevit in solidum arescente limo, quo pressa erat & cedens structura, &c.* that is, all Egypt is but a Concretion of Mud. For (if Homer may be believed) the Pharos was as far distant from the Continent, as a Ship with full Sail could run in a Day's time: but now it is joined to it. For Nilus flowing with troubled Waters brings down a great deal of Mud and Silt, and adding it to the old Land, carries on Egypt farther and farther still by an annual Increase. Hence it is of a fat and muddy Soil, and hath no Pores or Cavities in it. And this Reason he gives why it is not troubled with Earthquakes. Which also may be the Reason why it hath no fresh Springs and Fountains: For though indeed Dr. Robinson doth very probably impute its Want of Rain and Springs to the Want of Mountains; yet because (as we shall afterwards prove) Springs may be derived from Mountains at a good Distance,

Distance, I know not whether all Mountains are so far remote from *Egypt*, as that there may be no subterraneous Channels of that Length, as to derive the Water even thither from them; and, therefore, probably one Reason of their Wanting of Springs may be the Density and Thickness of the Soil, whereby it becomes impenetrable to the Water; and it may be, should they use the same Artifices there, which the Inhabitants of the Lower *Austria*, and of the Territory of *Modena* and *Bologna* in *Italy* do, that is, dig and bore quite through this Coat of Mud till they come to a Sand, or looser Earth; they might, in like manner, procure themselves Fountains of springing Water. Thus, by Reason of the great Rivers, *Po*, *Atthesis*, *Brenta*, and others, which empty themselves into the *Lagune*, or Shallows about *Venice* in *Italy*, and in Times of Floods bring down thither great store of Earth; those *Lagune* are in danger to be in time atterrated, and with the City situate in the midst of them, added to the firm Land, they being already bare at every Ebb, only Channels maintain'd from all the neighbouring Places to the City, not without considerable Charge to the State in Engines and Labourers in some Places to clear them of the Mud, wherewith otherwise they would indanger to be obstructed and choaked up; which Engines they call *Cava-fango's*. Thus in the  
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*Camarg*, or Isle that the River *Rhofne* makes near *Arles* in *Provence*, there hath been so much lately gained from the Sea, that the Watch-Tower had, in the Memory of some Men living 1665, been removed forward three times, as we were there informed; which I have already entred in this Work. And it seems to me probable, that the whole *Low-Countrys* were thus gained from the Sea: For, *Varenius* in his Geography tells us, ‘ That sinking a Well at *Amsterdam*, at ‘ near a hundred Foot depth, they met with ‘ a Bed or Floor of Sand and Cockle-Shells; ‘ whence it is evident, one would think, that ‘ of Old Time the Bottom of the Sea lay so ‘ deep, and that that hundred Foot Thickness ‘ of Earth above the Sand arose from the Sediments of the Waters of those great Rivers, ‘ the *Rhine*, *Scheld*, *Maes*, &c. which thereabouts emptied themselves into the Sea, and, ‘ in Times of Floods, brought down with ‘ them abundance of Earth from the upper ‘ Grounds.” The same Original, doubtless, had that great Level of the Fens, running through the Isle of *Ely*, *Holland* in *Lincolnshire*, and *Marshland* in *Norfolk*. That there hath been no small Quantity of Earth thus brought down, appears also in that along the Channels of most great Rivers; as for Example, the *Thames* and *Trent* in *England*, especially near their Mouths or Out-lets, between the Mountains and higher Grounds  
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on each Side, there are large Levels and Plains; which seem to have been originally Part of the Sea, raised up, and atterrated by Earth and Silt brought down by those Rivers in great Floods.

Strabo, in the First Book of his Geography, hath much to this purpose: Ἡ γὰρ περὶ σχωσίς περὶ αὐτὰ συνίσταται τὰ σώματα τῶν ποταμῶν. οἷον περὶ μὲν τὰ τῆ Ἰσθμοῦ τὰ λεγόμενα Στήθη, καὶ ἡ Σκυθίων ἐρημία. περὶ ἣ τὰ τῆ Φάσιδος ἡ Κολχικὴ παραλία, διάμμος, καὶ ταπεινὴ, καὶ μαλακὴ ἔσται. περὶ ἣ τὸν Θερμόδοντα καὶ τὸν Ἰρην ὅλη ἡ Θεμισκυρα, τὸ τῶν Ἀμαζόνων πεδίον, καὶ τῆς Σιδύνης τὸ πλεον. Οὕτω ἣ καὶ ἐπὶ τῶν ἄλλων, ἅπαντες γὰρ μιμῶνται τὸν Νεῖλον, ἐξηπειρῶντες τὸν περὶ αὐτῶν πόρον, οἱ μὲν μᾶλλον, οἱ δ' ἥττον. ἥττον μὲν οἱ μὴ πολλήν τε καὶ μαλακόγειον χώραν ἐπίοντες καὶ χειμάρρους δεχόμενοι πολλὰς. ὧν ἐστὶ καὶ ὁ Πύραμος, ὁ τῇ Κιλικίᾳ πολὺ μέρος προσθεῖς. ἐφ' ἧ καὶ λόγιον ἐκπεπτωκέ τι τοιοῦτον,

Ἔσσεται ἐσσομένοις ὅτε Πύραμος εὐρυοδίνης

Ἡῖονα περὶ ἑὸν ἱερὸν ἐς Κύπρον ἵκηται.

And after a while, he adds, Οὕτω μὲν ἐν ἐνδέχεται περὶ σχωσθῆναι τὸ πέλαγος πᾶν ἀπὸ τῶν αἰγιαλῶν ἀρξάμενον, ἂν συνεχεῖς ἔχῃ τὰς ἐκ τῶν ποταμῶν ἐπιρρύσεις. That is, *For this Landing up and Atteration of the Skirts of the Sea, is, for the most part, about the Mouths of Rivers, as about the Out-lets of Ister, the Places called Στήθη, and the Deserts of Scythia; about those of Phasis, the Sea-coast of Colchis, which is sandy,*

sandy, and low, and soft; about Thermodon and Iris, all Themiscyra, the Plain of the Amazons, and the most Part of Sidene. And the like may be said of other Rivers. For all of them imitate the Nile, adding to the Continent or Main Land the Part lying before their Mouths, some more, some less; those less, that bring not down much Mud; and those more, that run a great way over soft and loose Ground, and receive many Torrents: Of which Kind is the River Pyramus, which hath added a great Part of its Land to Cilicia. Concerning which there is an Oracle come abroad, importing, That there will a Time come in future Ages, when the River Pyramus shall carry on the Shore and Land up the Sea as far as Cyprus. . . . . So it might in Time happen, that the whole Sea should gradually be landed up, beginning from the Shores, if the Effusions of the Rivers, that is, the Earth and Mud they bring down, did spread so wide as to be continuous. Thus far Strabo. But the Oracle he mentions, predicting the Carrying on and Continuation of Cilicia as far as Cyprus, and the joining that Island to the Continent, proves false; there having not been as yet, that we hear or read of, any considerable Advance made towards it, in almost 2000 Years.

Now, the Rain thus continually washing away, and carrying down Earth from the Mountains and higher Grounds, and raising

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up the Valleys near the Sea, as long as there is any Descent for the Rivers, so long will they continue to run, carry forward the low Ground, and streighten the Sea; which also by its Working, by reason of the Declivity, easily carries down the Earth towards the lower and middle Part of its Channel [*Alveus*,] and by Degrees may fill it up. Monsieur *Loubere*, in his late Voyage to *Siam*, takes Notice of the Increase of the Banks and Sands in and near the Mouths of the great Rivers of the Oriental Kingdoms, occasion'd by the Sediments brought down from the Countries by the several Streams; so that, *says he*, the Navigation into and up those Rivers grows more and more difficult, and may in Process of Time be quite interrupted. The same Observation, I believe, may be made in most of our great *European* Rivers, wherein new Beds are rais'd, and old ones enlarged. Moreover, the Clouds still pouring down Rain upon the Earth, it will descend as far as there is any Declivity; and where that fails, it will stagnate, and, joining with the Sea, cover first the Skirts of the Earth, and so, by Degrees, higher and higher, till the whole be covered.

To this we may add, that some Assistance toward the leveling of the Mountains, may be contributed by the Courses and Cataracts of subterraneous Rivers washing away the Earth continually, and weakning their  
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Foundations, so by Degrees causing them to founder, subside, and fall in. That the Mountains do daily diminish, and many of them sink; that the Valleys are raised; that the Skirts of the Sea are attrited, no Man can deny. That these things must needs, in Process of Time, have a very considerable and great Effect, is as evident; which what else can it be, than that we have mentioned?

MOREOVER, towards this levelling of the Mountains, and filling up of the Sea, the Fire also contributes its Mite. For the burning Mountains or *Vulcano's*, as for Example, *Ætna* and *Vesuvius*, vomit at Times out of their Bowels, such prodigious Quantities of Sand and Ashes, and with that Force, that they are by the Winds carried and dispersed all over the Country, nay, transported over Seas into foreign and remote Regions; but let fall so copiously in the circumjacent Places, as to cover the Earth to a considerable Thickness; and not only so, but they also pour forth Floods of melted Stones, Minerals, and other Materials, that run down as low as the Sea, and fill up the Heavens, as of old one near *Catana*; and make Moles, and Promontories, or Points, as in the last Eruptions both of *Ætna* and *Vesuvius*; the Tops of these Mountains falling in, and subsiding proportionably to the Quantity of the ejected Matter, as *Borellus* proves. Meeting with a Quotation in Dr. *Hakewill's* Apology out of

*Josephus Blancanus* his Book *De Mundi Fabricâ*, I earnestly desired to get a Sight of that Book, but could not procure it till the Copy of this Discourse was out of my Hands, and sent up to *London*, in order to its Printing. But then obtaining it, I found it so exactly consonant to my own Thoughts, and to what I have here written concerning that Subject; and some Particulars occurring therein by me omitted, that I could not forbear translating the whole Discourse into *English*, and annexing it to this Chapter, especially because the Book is not commonly to be met with. The Discourse is first set down in his Book *De locis Mathematicis Aristotelis* more at large, and afterward repeated in his Book *De Mundi Fabricâ* more briefly.

PERGRATUM *Lectori fore existimaui, si rem scitu dignissimam exposuero, &c.* I thought it might be very acceptable to the Reader, if I should discover to him a thing most worthy to be known; which I have long ago, and for a long time observed, and am daily more confirmed in; especially, seeing no former Writer that I know of hath published any thing concerning it. It is this, That the *Superficies* of the whole Earth, which is now rough and uneven by reason of Mountains and Valleys, and so only rudely Spherical, is daily from the very Beginning of the World reducing to a perfect Roundness, insomuch that it will necessarily come to pass

pass in a Natural way, that it be one Day overflown by the Sea, and rendred uninhabitable.

FIRST then, that we may clearly apprehend the Causes of this Thing, we must lay down as a Foundation from Holy Writ, That the Terraqueous Globe was, in the Beginning, endued with a more perfect spherical Figure, that is, without any Inequalities of Mountains and Valleys; and that it was wholly covered with the Sea, and so altogether unfit for terrestrial Animals to inhabit: But it was then rendred habitable, when by the Beck or Command of its Creator, the greatest Part of the Land was translated from one Place to another; whereupon here appeared the Hollows of the Seas, there the Heights of the Mountains: And all the Waters, which before covered the Face of the whole Earth, receded, and flowing down, filled those depressed and hollow Places; and this Congregation of Waters was called the Sea. Hence some grave Authors doubt not to assert, That the Mountains were made up of that very Earth which before filled the Cavities of the Sea. Whence it follows, that the Earth, as now it is, is mountainous and elevated above the Waters, hath not its natural Figure, but is in a violent State: but *Nullum violentum est perpetuum*. Besides, the Earth being heavier than the Water, none of its Parts ought to be extant, and ap-

pear above its Superficies; and yet we see that the Earth is really higher than the Sea, especially the mountainous Parts of it: In which respect also, both Land and Water are in a violent State. Wherefore, it is very convenient to the Nature of both, that they should daily return towards their ancient and primigenial State and Figure; and, accordingly, we affirm that they do so.

MOREOVER, we say, that the Waters, both of Rains and Rivers, are the Cause of this Restitution, as will appear by the following Observations.

1. WE see that Rivers do daily fret, and undermine the Roots of the Mountains; so that here and there, from most Mountains, they cause great Ruins and Precipices, whence the Mountains appear broken; and the Earth, so fallen from the Mountains, the Rivers carry down to the lower Places.

FROM these Corrosions of the Rivers, proceed those slow, but great Ruins, called, *Labina, à labendo*; in which some Streets and whole Villages are precipitated into the Rivers.

2. WE daily see, that the Rain-Waters wash away the *Superficies* of the Mountains, and carry them down to the lower Places. Hence it comes to pass, that the higher Mountains are also harder and more stony than the rest, by means whereof they better resist the Water. Hence also it comes to pass, that



that ancient Buildings in Mountains, their Foundations being by Degrees discovered, prove not very durable. For which Reason, the Foundations of the *Roman Capitol* are now wholly extant above-ground; which of old, at its first Erection, were sunk very deep into it. This same thing all the Inhabitants of the Mountains do confirm; all saying, that this Lowering of Mountains was long since known to them; for that, formerly, some intermediate Mountains intercepted the Sight of a Castle, or Tower, situate in a more remote Mountain; which, after many Years, the intervenient Mountain being depressed, came clearly into View. And *George Agricola* is of Opinion (which I very much approve of) that the Rivers produced the Mountains and Hills in this manner. In the Beginning of the World, there were not so many particular divided Mountains, but only perpetual eminent Ridges of Land, not dissected into so many Valleys as we now see. So, for Example, our *Appennine* was at first one continued, eaven, eminent Ridge of Land, not divided into any particular Mountains and Hills by intervening Valleys, as now it is; but that after the Rivers began to flow down from the Top of it, by little and little fretting and corroding the Ground, they made Valleys, and daily more and more; and by this means the whole *Appennine* came to be divided into many Hills and Mountains.

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3. IN Plains we see the directly Contrary happens ; for the Plains are daily more and more elevated, because the Waters do let fall, in the plain and hollow Places, the Earth they brought down with them from the Mountains. Hence we see that ancient Buildings in such Places, are almost wholly buried in the Ground. So in *Rome*, at the Foot of the *Capitoline Mountain*, we see the *Triumphal Arch of Septimius* almost wholly overwhelmed in the Earth ; and every where in ancient Cities, many Gates and Doors of Houses almost landed up, little thereof being extant above Ground.

FROM which it appears, that this Sinking and Demersion of Buildings into the Earth is a manifest Sign of their Antiquity, which is so much the greater, by how much the deeper they are sunk. So, for Example, at *Bononia* in *Italy*, many of the ancient Gates of the City, which the *Bolognese* call *Torresotti*, are very deeply sunk, which is a certain Argument of their Antiquity ; and thence it appears to be true that Histories relate, that they were built in the Time of *S. Petronius*, about 1200 Years ago. But here it is to be noted, that other things agreeing, those are deeper depressed that are built in lower Places, than those in higher, for the Reason aforesaid. So at *Bononia*, that old Port, called *Il Torresotto di S. Georgio*, is deeper buried, or landed up, than that which is called

led *Il Torresotto di Stra Castilione*, because that is situated in a lower Place, and therefore the Earth is more easily raised up about it.

4. THE same is affirmed by Architects, who, when they dig their Foundations, do every where, in plain Places, first of all remove the Earth, which they call *Commota*, [loose or shaken] which is mixt with Fragments of Wood, Iron, Rubbish, Coins, ancient Urns, and other things; which when it is thrown out, they come to another sort of Earth that hath never been stirred, but is solid, compact, and not mixt with any heterogeneous thing, especially artificial. That moved [*Commota*] and impure Earth, is it which the Waters have by little and little brought down from the higher to the more depressed Places, which is not every where of equal Depth. But now, because in the Mountains there is no where found such moved or new Earth, as is plain from the Experience of Architects, it is manifest that the Mountains do by no means grow or increase, as some dream.

5. OUR Observation is proved from that Art, which is now much practised, of elevating and landing up depressed Places by the Waters of Rivers, and depressing the higher by running the Water over them.

THE same things happen about the Sea; for, whereas the Bottom of the Sea is more de-

depressed than the *Superficies* of the Earth ; and all the great Rivers empty themselves into the Sea, and bring in with them a great Quantity of Earth and Sand, there must needs be great Banks or Floors of Earth raised up about the Sea Shores, near the Mouths of Rivers, whereby the Shores must necessarily be much promoted and carried forward into the Sea, and so gain upon it, and compell it to recede.

THIS may be proved, first by the Authority of *Aristotle*, lib. 1. *Meteor. cap. De permutatione terræ ac maris* ; and that of the ancient Geographers and Historians. To omit that Proof from *Egypt* ; *Aristotle's* second Example of this Landing up of the Sea, is the Region of *Ammonia*, whose Lower and Maritime Places (saith he) it's clear, were by this Landing up first made Pools and Fens, and in Process of time these Pools were dried up, and raised to be firm Land, by Earth brought down. A third Example is that of the *Mæotis Palus*, whose Skirts are so grown up by what the Rivers bring down, that the Waters will not carry any thing so great as Ships, as they would have done sixty Years ago. A fourth is the *Thracian Bosphorus*, which for Brevity's-sake may be seen in him. Add hereto, in the fifth Place, the Testimony of *Pliny*, who tells us, that much new Land hath been added to the Earth, not only brought

brought in by the Rivers, but deserted by the Sea.

So the Sea hath receded ten Miles from the Port of *Ambracia*, and five from that of *Athens*, and in several other Places more or less. What he adds out of *Strabo*, concerning the River *Pyramus*, is already enter'd.

6. NEITHER are later and nearer Experiments wanting. Of old time *Ravenna* stood upon the Brink of the Sea Shore, which is now by reason of the Landing up the Shallows far distant from it. The Sea washed the Walls of *Padua*, which is now Twenty five Miles remote therefrom. In fine, our *Rhene* of *Bologna*, though it be but a small Torrent, yet in a few Years, since it hath been by an artificial Cut let into the *Po*, it hath so filled it up, and obstructed its Channel with Sand and Mud, that it hath much endamaged the neighbouring Fields. Seeing then by these various Aggerations of Sand and Silt, the Sea is daily cut short, and driven back, and its Basin or Receptracle straitned, and the Bottom thereof raised, it will necessarily come to pass in time, that it will begin to overflow; as now it happens in many Places, for Example, in the *Baltick*, *Danick*, and *Holland* Shores, in which Places they are forced to erect and maintain long and high Banks and Fences against the Inundations of the Sea.

THEREFORE, after this manner, that Earth which now makes up the Mountains, being  
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by the Water little by little brought down into the Cavities of the Sea, is the Cause why the Sea gradually here and there overflows the *Superficies* of the Earth; and so the Globe of the Earth, by the Affusion of the Waters, will be again render'd uninhabitable, as at first it was in the Beginning of the World; and the Earth and Water will return to their primitive State and Figure, in which they ought naturally to rest.

HENCE we may deduce some Consecutaries worthy to be known, *viz.* That the World, or at least the Earth, was not endued with that Figure which we now see; neither can the World endure for ever. For if this mountainous Figure had been in it from Eternity, all those Protuberancies of the Mountains had been long since eaten away and wasted, or consumed by the Waters. Nor can this World be Eternal; because, as we have proved, in Process of time it will be reduced to a perfect Rotundity, and be overflown by the Sea; whereupon it will become uninhabitable, and Mankind must necessarily perish. Wherefore, unless that Deluge were prevented by the Fire which the Holy Scriptures mention, the World would nevertheless be destroyed by Water. Long after I had committed these things to writing, I met with *Philo Judeus* his Book *De Mundo*, wherein he touches this Matter but obscurely, and in a very few Words.

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THUS far *Blancanus*, whose Sentiments and Observations concerning this Matter thus punctually concurring, and according with mine, to my great Wonder and Satisfaction, I could not but think that the Conclusion hath a high Degree of Probability. Only he takes no Notice, that in Compensation of what the Rivers gain from the Sea about their Outlets, the Sea may gain from the Land by undermining and washing away the Shores that are not rocky, (as we see it doth in our own Country) perhaps as much as it loses, according to the vulgar Proverb before remember'd. However, all contributes towards the filling up of the Sea, and bringing on an Inundation, as I shall afterwards shew.

BUT it may be objected, That if the Waters will thus naturally and necessarily in Process of time again overflow and cover the Earth, how can GOD's Promise and Covenant be made good, *Gen. ix. 11.* That *there should not any more be a Flood to destroy the Earth.*

TO which I answer, 1. That though this would follow in a natural way, yet the Power of GOD may interpose to prevent it, and so make good His Promise. 2. Though it might come to pass in the Course of Nature, yet would it be after so many Ages, that it is not at all likely the World should last so long; but the Conflagration or Destruction of

of it by Fire, predicted by the Scriptures, will certainly prevent it. 3. Possibly there may be something in Nature which may obviate this Event, though to us at present unknown, which I am the more inclinable to believe, because the Earth doth not hasten so fast towards it, as some of the Ancients imagined, and as the Activity of such Causes might seem to require, as I have already intimated.

*Varenius*, in his Geography, putting the Question, Whether the Ocean may again come to cover all the Earth, and make an universal Deluge? answers, That we may conceive a way how this may naturally come to pass. The Manner thus; Supposing that the Sea by its continual Working doth undermine and wash away the Shores and Cliffs that are not rocky, and carry the Earth thereof down towards the Middle, or deepest Parts of its Channel, and so by Degrees fill it up. By doing this perpetually, it may, in a long Succession of Time, carry all away, and itself cover the whole Earth. That it doth thus subvert and wash away the Shores in many Places, is in Experience true. About *Dort* in *Holland*, and *Dullart* in *Friesland*, and in *Zealand* many Villages, some say Three hundred, have been drown'd by the Encroachments of the Sea, as some of their Towers and Steeples still extant above the Waters do testify. On the *Tuscan* Shore,

*Kircher*



**Kircher** tells us, That not far from *Ligorn*, he himself had observed a whole City under Water, that had been in former Times drown'd by the Inundation of the Sea. And overagainst *Puteoli*, in the *Sinus* of *Baia*, he tells us, That in the Bottom of the Sea, there are not only Houses but the Traces and Footsteps of the Streets of some City manifestly discernible. And in the County of *Suffolk*, almost the whole Town of *Done-wich*, with the adjacent Lands, hath been undermined and devoured by the Sea.

THIS Washing away of the Shores is, I conceive, in great Measure to be attributed to the forementioned streightning and cutting short of the Sea, by the Earth and Silt that in the Times of Floods are brought down into it by the Rivers. For the Vulgar have a Proverbial Tradition, *That what the Sea loses in one Place, it gains in another.* And both together do very handsomly make out and explain, how the Earth in a Natural way, may be reduced to its primitive State in the Creation, when the Waters covered the Land. But this, according to the leisurely Proceedings of Nature, would not come to pass in many Ages, I might say, in Ages of Ages: Nay, some think, that those vast Ridges and Chains of Mountains, which run through the Middle of the Continents, are by reason of their great Height, Weight and Solidity, too great a Morsel ever to be  
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devoured by the Jaws of the Sea. But whether they be or not, I need not dispute, though I incline to the Negative, because this is not the Dissolution the Apostle here speaks of, which must be by Fire.

BUT I must not here dissemble an Objection I see may be made, and that is, That the *Superficies* of the Earth is so far from being depressed, that it is continually elevated. For in ancient Buildings, we see the Earth raised high above the Foot of them. So the *Pantheon* at *Rome*, which was at first ascended up to by many [eight] Steps, is now descended down to by as many. The Basis and whole Pedestal of *Trajan's* Pillar there was buried in the Earth.

DR. *Tancred Robinson*, in the Year 1683, observed in some Places the Walls of old *Rome* to lie Thirty and Forty Foot under Ground; so that he thinks the greater Part of the Remains of that famous ancient City is still buried, and undiscovered; the prodigious Heaps of Ruins and Rubbish inclosed within the Vineyards and Gardens, being not half digged up or searched, as they might be, the Tops of Pillars peeping up and down. And in our own Country we find many ancient *Roman* Pavements at some Depth under Ground. My learned and ingenious Friend Mr. *Edward Lhwyd*, not long since inform'd of one, that himself had seen buried deep in the Church-yard

yard at *Wycheſter* in *Gloceſtershire*. Nay, the Earth in time will grow over and bury the Bodies of great Timber Trees, that have been fallen, and lie long upon it; which is made one great Reason, that ſuch great Numbers (even whole Woods) of ſubterraneous Trees are frequently met with, and dug up at vaſt Dépths in the *Spaniſh* and *Dutch Netherlands*; as well as in many Places of this Iſland of *Great Britain*.

To which I anſwer, as to Buildings, 1. The Ruins and Rubbiſh of the Cities wherein they ſtood, might be conceived to bury them as deep as they now lie under Ground. And by this means it's likely the *Roman Pavements* we find, might come to be covered to that Héight we mentioned. For that the Places where they occur, were anciently *Roman Towns* ſubverted and ruined, may eaſily be proved; as particularly in this we mention'd, from the Termination *Cheſter*; whatever Town or Village hath that Addition to its Name, having been anciently a *Roman Town* or *Camp*, *Cheſter* ſeeming to be nothing but *Caſtra*.

2. It is to be conſider'd, That weighty Buildings do in time overcome the Reſiſtance of the Foundation, unleſs it be a ſolid Rock; and ſink into the Ground.

NAY, the very ſoft Water, lying long upon the Bottoms of the Sea or Pools, doth ſo compreſs and ſadden them by its Weight,

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that

that the very Roads that are continually beaten with Horses and Carriages, are not so firm and sad: And in the Sea, the nearer you dig to the low Water-Mark, still the sadder and firmer it is: And it's probable, still the farther the sadder; which seems to be confirmed by the strong fixing of Anchors. [This Firmness of the Sand, by the Weight of the incumbent Water, the People inhabiting near the Sea are so sensible of, that I have seen them boldly ride through the Water cross a Channel three Miles broad, before the Tide was out, when in some Places it reach'd to the Horses Belly.] A Resemblance whereof we have in Ponds, which being newly digg'd, the Water that runs into them, sinks soon into the Earth, and they become dry again; till after some time, by often filling, the Earth becomes so solid, through the Weight of the Water, that they leak no more, but hold Water up to the Brink. *Wittie Scarborough Spaw*, p. 86.

WHAT Force a gentle, if continual Pressure hath, we may understand also by the Roots of Trees, which we see will sometimes pierce through the Chinks of Stone Walls, and in time make great Cracks and Rifts in them; nay, will get under their very Foundations. The tender Roots of Herbs overcome the Resistance of the Ground, and make their way through Clay or Gravel. By the  
by,

by, we may here take Notice, that one reason why Plowing, Harrowing, Sifting, or any Commimution of the Earth, renders it more fruitful, is, because the Roots of Grass, Corn, and other Herbs can, with more Facility, creep abroad, and multiply their Fibres in the light and loose Earth.

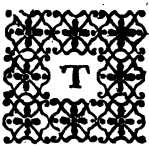
THAT the Rotting of the Grass, and other Herbs upon the Ground, may in some Places raise the *Superficies* of it, I will not deny; that is, in Gardens and Enclosures, where the Ground is rank, and no Cattel are admitted to eat off the Fog or long Grass; but elsewhere, the Raising of the *Superficies* of the Earth is very little and inconsiderable; and none at all, unless in level Grounds, which have but little Declivity: For otherwise the Soil would by this time have come to be of a very great Depth, which we find to be but shallow. Nor do I think, that so much as the Trunks of fallen Trees are by this means cover'd; but rather, that they sink by their own Weight, in time overcoming the Resistance of the Earth, which without much Difficulty yields, being soaked and softned by the Rains insinuating into it, and keeping it continually moist in Winter-time. But if these Buildings be situate in Valleys, it is clear, that the Earth brought down from the Mountains by Rain, may serve to land them up. Again, the *Superficies* of the Earth may be raised near the Sea Coast, by the

continual Blowing up of Sand by the Winds. This happens often in *Norfolk*, and in *Cornwall*, where I observed a fair Church, *viz.* that of the Parish called *Lalant*, which is the Mother Church to *S. Ives*, and above two Miles distant from the Sea; almost covered with the Sand; little being extant above it, but the Steeple and Ridge of the Roof. Nay, a great Part of *S. Ives* itself lies buried in the Sand: And I was told there, that in one Night there had been a whole Street of Houses so covered with Sand, that in the Morning they were fain to dig their way out of their Houses through it. All along the Western Shore of *Wales*, there are great Hills of Sand thus blown up by the Wind. We observed also upon the Coast of *Flanders* and *Holland*, the like sandy Hills, or Downs, from which Westerly Winds drive the Sand a great way into the Country. But there are not many Places liable to this Accident, *viz.* where the Bottom of the Sea is sandy, and where the Wind most frequently blows from off the Sea; where the Wind sets from the Land toward the Sea this happens not; where it is indifferent, it must in reason carry off as much as it brings on, unless other Causes hinder.



S E C T. II.

The Second possible Cause of the World's Destruction in a Natural Way, the Extinction of the Sun.

II.  THE Possibility of the Sun's Extinction : Of which Accident I shall give an Account of Dr. More's Words, in the last Chapter of his Treatise of the *Immortality of the Soul*. ' This (saith he) though it may seem a *Panick Fear* at first Sight ; yet if the Matter be thoroughly examined, there will appear no contemptible Reasons that may induce Men to suspect, that it may at last fall out, there having been at certain Times such near Offers in Nature towards this sad Accident already." *Pliny* speaks of it as a thing not unfrequent, that there should be *Prodigiosi & longiores Solis defectus, qualis occiso Dictatore Cæsare, & Antoniano bello, totius anni pallore continuo*, *Hist. Nat. lib. 2, cap. 30.* *Prodigious and lasting Defects of the Sun, such as happened when Cæsar the Dictator was slain, and in the War with Anthony, when it was continually pale and gloomy for a whole Year.* The like happened in *Justinian's* Time, as *Cedrenus* writes ; when for a whole Year together, the Sun was of a very dim and dusky Hue, as if

he had been in a perpetual Eclipse : And, in the Time of *Irene* the Emperess, it was so dark for Seventeen Days together, that the Ships lost their Way in the Sea, and were ready to run one against another, as *Theophanes* reports. But the late accurate Discovery of the Spots of the Sun by *Scheiner*, and the Appearing and Disappearing of Fixed Stars and Comets, and the Excursions of these last, do argue it more than possible, that after some vast Periods of Time, the Sun may be so inextricably enveloped by the *Macula*, that he may quite lose his Light; and then you may easily guess what would become of the Inhabitants of the Earth : But without his vivifick Heat, neither could the Earth put forth any Vegetables for their Sustenance; neither if it could, would they be able to bear the Extremity of the Cold, which must needs be more rigorous, and that perpetually, than it is now under the Poles in Winter-time. But this Accident, tho' it would indeed extinguish all Life, yet being quite contrary to a Dissolution by Fire, of which the Apostle speaks, I shall pass it over without farther Consideration, and proceed to a Third.



SECT.



SECTION III.

The Third possible Cause of the World's Destruction, the Eruption of the Central Fire.

III. ~~THE~~ POSSIBILITY of the Eruption of the Central Fire, if any such there be, inclosed in the Earth. It is the *Hypothesis* of Monsieur *des Cartes*, that the Earth was originally a Star, or Globe of Fire, like the Sun, or one of the Fixt Stars, situate in the Center of a *Vortex* continually whirling round with it. That by Degrees it was covered over, or incrustated with *Maculae*, arising on its Surface like the Scum on a boiling Pot, which still increasing and growing thicker and thicker, the Star losing its Light and Activity, and, consequently, the Motion of the celestial *Vortex* about it growing more weak, languid, and unable to resist the vigorous Inereachments of the neighbouring *Vortex* of the Sun; it was at last drawn in, and wholly absorpt by it, and forced to comply with its Motion, and make one in the Quire of the Sun's *Satellites*. This whole *Hypothesis* I do utterly disallow and reject. Neither did the Author himself (if we may believe him) think it true, that the Earth was thus generated. For he saith, *Quinimo*

*ad res naturales melius explicandas, earum causas altius hic repetam quam ipsas unquam extitisse existimem. Non enim dubium est, quin mundus ab initio fuerit creatus cum omni sua perfectione, ita ut in eo & Sol, & Terra, & Luna, & Stelle extiterint. . . . .*

*Hoc fides Christiana nos docet; hocque etiam ratio naturalis plane persuadet. Attendendo enim ad immensam Dei potentiam, non possumus existimare illum unquam quidquam fecisse, quod non omnibus suis numeris fuerit absolutum: That is, Moreover, for the better explicating of Natural Things, I shall bring them from higher or more remote Causes than I think they ever had. For there is no doubt, but the World was originally created in its full Perfection, so that in it were contained both Sun, and Moon, and Earth, and Stars, &c. For this the Christian Faith teacheth us, and this also Natural Reason doth plainly persuade; for attending to the immense Power of GOD, we cannot think that He ever made any thing that was not complete in all Points. But tho' he did not believe that the Earth was generated, or formed according to his Hypothesis, yet surely he was of Opinion, that it is at present such a Body as he represented it after its perfect Formation, viz. with a Fire in the middle, and so many several Crusts or Coats inclosing it; else would he have given us a meer Figment or Romance instead of a Body of Philosophy.*

BUT

BUT tho' I do reject the *Hypothesis*; yet the Being of a Central Fire in the Earth is not, so far as I understand, any way repugnant to Reason or Scripture. For first of all, the *Scripture* represents Hell as a Lake of Fire, *Mark ix. 43, 44, &c. Rev. xx. 10, 14, 15.* and, likewise, as a low Place beneath the Earth. So *Psal. lxxxvi. 13. and Deut. xxxii. 22.* it is called the *nethermost Hell*, *Prov. xv. 24. The Way of Life is above to the Wise, that he may depart from Hell beneath.* 2. Many of the Ancients understand that Article of the Creed, *He descended into Hell*, of our Saviour's Descent into that local Hell beneath the Earth, where He triumphed over the Devil, and all the Powers of Darkness. And, particularly, *Irenaus* interprets that Saying of our Saviour, *That the Son of Man should be three Days in the Heart of the Earth*, of his being three Days in the Middle of the Earth, which could not be meant (*saith he*) of the Sepulchre, because that was hewn out of a Rock in its *Superficies*. 3. It is a received Opinion among the Divines of the Church of *Rome*, that Hell is about the Center of the Earth; insomuch as some of them have been solicitous to demonstrate, that there is room enough to receive all the Damned, by giving us the Dimensions thereof.

NEITHER is it repugnant to the History of the Creation in *Genesis*. For tho' indeed *Moses* doth mention only Water and Earth, as the

the Component Parts of this Body; yet doth he not assert, that the Earth is a simple, uniform, homogeneous Body; as neither do we, when we say, *Upon the Face of the Earth*, or the like. For the Earth, we see, is a Mass made up of a Multitude of different Species of Bodies, *Metals, Minerals, Stones, and other Fossils, Sand, Clay, Marl, Chalk, &c.* which do all agree, in that they are consistent and solid more or less, and are in that respect contradistinguished to Water; and together compound one Mass, which we call Earth. Whether the interior Parts of the Earth be made up of so great a Variety of different Bodies, is to us altogether unknown. For tho' it be observed by Colliers, that the Beds of Coals lie one way, and do always dip towards the East, let them go never so deep; so that, would it quit Cost, and were it not for the Water, they say, they might pursue the Bed of Coals to the very Center of the Earth, the Coals never failing or coming to an End that way; yet that is but a rash and ungrounded Conjecture. For, what is the Depth of the profoundest Mines, were they a Mile deep, to the Semidiameter of the Earth? not as One to Four thousand. Comparing this Observation of Dipping with my Notes about other Mines, I find that the Veins or Beds of all generally run East and West, and dip towards the East. Of which, what Account or Reason can we give, but the

the Motion of the Earth from West to East ?  
 I know some say, that the Veins, for Exam-  
 ple, of Tin and Silver, dip to the North,  
 tho' they confess they run East and West,  
 which is a thing I cannot understand, the  
 Veins of those Metals being narrow things.  
 Sir Tho. Willoughby, in his forementioned  
 Letter, writes thus : ——— ' I have talked  
 ' with some of my Colliers about the Lying  
 ' of the Coal, and find, that generally the Bas-  
 ' set-End (as they call it) lies West, and runs  
 ' deeper toward the East, allowing about  
 ' twenty Yards in Length to gain one in  
 ' Depth; but sometimes they decline a little  
 ' from this Posture; for mine lie almost South-  
 ' West, and North-East. They always sink to  
 ' the East more or less. There may, therefore;  
 ' for ought we know, be Fire about the Cen-  
 ' ter of the Earth, as well as any other Body;  
 ' if it can find a *Pabulum*, or Fuel there to  
 ' maintain it. And why may it not? since the  
 ' Fires in those subterraneous Caverns of *Æti-  
 ' na*, *Vesuvius*, *Stromboli*, *Hæcla*, and other  
 ' burning Mountains or *Vulcano's*, have found  
 ' wherewith to feed them for Thousands of  
 ' Years. And as there are at some, tho' un-  
 ' certain Periods of Time, violent Eruptions  
 ' of Fire from the *Craters* of those Mountains,  
 ' and mighty Streams of melted Materials  
 ' poured forth from thence: So, why may  
 ' not this Central Fire in the Earth, (if any  
 ' such there be) receiving accidentally extra-  
 ' ordinary

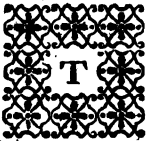
' ordinary Supplies of convenient Fuel, either  
 ' from some inflammable Matter within or from  
 ' without, rend the thick exterior *Cortex*  
 ' which imprisons it, or finding some Vents  
 ' and Issues, break forth and overflow the  
 ' whole *Superficies* of the Earth, and burn up  
 ' all Things." This is not impossible; and  
 we have seen some *Phænomena* in Nature  
 which bid fair towards a Probability of it.  
 For, what should be the Reason of new Stars  
 appearing and disappearing again? as that no-  
 ted one in *Cassiopeia*, which at first shone with  
 as great a Lustre as *Venus*, and then by De-  
 grees diminishing, after some two Years va-  
 nish'd quite away? But that by great Sup-  
 plies of combustible Matter, the internal Fire  
 suddenly increasing in Quantity and Force,  
 either found, or made its Way through the  
 Cracks or Vents of the *Macule* which in-  
 closed it, and in an instant, as it were, over-  
 flowed the whole Surface of the Star, whence  
 proceeded that illustrious Light; which af-  
 terwards again gradually decayed, its Supply  
 failing. Whereas other newly appearing Stars,  
 which either have a constant Supply of Mat-  
 ter, or where the Fire hath quite dissolved  
 the *Macule*, and made them comply with  
 its Motion, have endured for a long time,  
 as that which now shines in the Neck of  
*Cygnus*, which appears and disappears at cer-  
 tain Intervals.

BUT

BUT because it is not demonstrable that there is any such Central Fire in the Earth, I propose the Eruption thereof rather as a possible than probable Means of a Conflagration: And proceed to the last Means whereby it may naturally be effected; and that is:

S E C T. IV.

*The Fourth Natural Cause of the World's Dissolution, the Earth's Dryness and Inflammability.*

IV.  HE Dryness and Inflammability of the Earth under the Torrid Zone, with the Eruption of the *Vulcano's* to set it on fire. Those that hold the Inclination of the *Equator* to the *Ecliptick* daily to diminish, so that after the Revolutions of some Ages they will jump and consent, tell us, that the Sun-Beams lying perpendicularly and constantly on the Parts under the *Equator*, the Ground thereabout must needs be extremely parch'd and rendred apt for Inflammation. But for my part, I own no such Decrement of Inclination. And the best Mathematicians of our Age deny, that there hath been any since the eldest Observations that are come down to us. For tho', indeed, *Ptolemy* and *Hipparchus* do make it more than we find it by above twenty Minutes, yet that Difference is not so

so considerable, but that it may well be imputed to the Difference of Instruments, or Observations in Point of Exactness. So that not having decreased for Eighteen hundred Years past, there is not the least ground for Conjecture, that it will alter in Eighteen hundred Years to come, should the World last so long. And yet if there were such a Diminution, it would not conduce much (so far as I can see) to the bringing on of a Conflagration. For tho' the Earth would be extremely dried, and perchance thereby rendered more inflammable; yet the Air being by the same Heat as much rarified, would contain but few nitrous Particles, and so be inept to maintain the Fire, which, we see, cannot live without them: It being much deadened by the Sun shining upon it; and burning very remissly in Summer-time, and hot Weather. For this Reason, in Southern Countries, in extraordinary hot Seasons, the Air scarce sufficeth for Respiration. To the clearing up of this, let us a little consider what Fire is. It seems to consist of three different Sorts of Parts. 1. An extremely thin and subtil Body, whose Particles are in a very vehement and rapid Motion. 2. A (supposed) Nitrous *Pabulum*, or Fewel, which it receives from the Air. 3. A sulphureous or unctuous *Pabulum*, which it acts and preys upon; passing generally by the Name of Fewel. This forementioned subtil Body

\* agita-



lightning the (supposed) Nitrous Particles it receives from the Air, doth by their Help, as by Wedges, to use that rude Similitude, penetrate the unctuous Bodies, upon which it acts, and divide them into their immediate component Particles, and at length, perchance into their first Principles; which Operation is called the Chymical Anatomy of mix'd Bodies. So we see Wood, for Example, divided by Fire into Spirit, Oil, Water, Salt, and Earth.

THAT Fire cannot live without those Particles it receives from the Air, is manifest, in that, if you preclude the Access of all Air, it is extinguished immediately: And in that, where and when the Air is more charged with them, as in cold Countries, and cold Weather, the Fire rages most: That likewise it cannot be continued without an unctuous *Substratum*, or Fuel, I appeal to the Experience of all Men.

No w then, in the rarified Air in the Torrid Zone, the nitrous Particles being proportionably scattered and thin set, the Fire that might be kindled there would burn but very languidly and remissly, as we said just now: And so the Eruptions of *Vulcano's*, if any such happened, would not be like to do half the Execution there that they would do in cold Countries. And yet I never read of any spreading Conflagration caused by the Eruptions of any *Vulcano's*, either in hot Countries,

tries, or in cold. They usually cast out a-bundance of thick Smoak, like Clouds darkening the Air; and likewise Ashes and Stones, sometimes of a vast Bigness; and some of them, as *Vesuvius*, Floods of Water; others, (as *Ætna*) Rivers of melted Materials, running down many Miles: As for the Flames that issue out of their Mouths at such Times, they are but transient, and mounting upwards, seldom set any thing on fire.

BUT not to insist upon this, I do affirm, that there hath not as yet been, nor for the future can be, any such Drying or Parching of the Earth under the *Torrid Zone*, as some may imagine. That there hath not yet been, I appeal to Experience, the Countries lying under the Course of the Sun, being at this Day as fertile as ever they were, and wanting no more Moisture now than of old they did; having as constant and plentiful Rains in their Seasons as they then had. That they shall for the future suffer any more Drought than they have heretofore done, there is no Reason to believe or imagine; the Face of the Earth being not altered, nor naturally alterable, as to the main, more at present than it was heretofore. I shall now add the Reason, why, I think, there can be no such Exsiccation of the Earth in those Parts. It's true indeed, were there nothing to hinder them, the Vapours exhaled by the Sun-Beams in those hot Regions, would be cast

cast off to the North, and to the South, a great way, and not fall down in Rain there, but towards the Poles : But the long and continued Ridges or Chains of exceeding high Mountains are so disposed by the great and wise Creator of the World, as, at least in our Continent, to run East and West, as *Gassendus* in the Life of *Peireskius* well observes, such are *Atlas*, *Taurus*, and the *Alps*, to name no more : They are, I say, thus disposed, as if it were on purpose to obviate and stop the Evagation of the Vapours Northward, and reflect them back again, so that they must needs be condensed, and fall upon the Countries out of which they were elevated. And on the South Side, being near the Sea, it is likely that the Wind, blowing for the most part from thence, hinders their Excursion that way. This I speak by Presumption, because in our Country, for at least three Quarters of the Year, the Wind blows from the great *Atlantick* Ocean ; which was taken Notice of by *Julius Cæsar* in the Fifth of his Commentaries, *De Bello Gallico*. *Corrus ventus, qui magnam partem omnis temporis in his locis flare consuevit.*

As for any Desiccation of the Sea, I hold that by meer natural Causes to be impossible, unless we could suppose a Transmutation of Principles or Simple Bodies, which for Reasons alledged in a former Discourse I cannot allow. I was then, and am still of Opinion,

C c

that

that G<sup>o</sup>d Almighty did at first create a certain and determinate Number of Principles, or variously figured Corpuscles, intransmutable by the Force of any natural Agent, even Fire itself, (which can only separate the Parts of heterogeneous Bodies) yet not an equal Number of each Kind of these Principles, but of some abundantly more, as of *Water, Earth, Air, Æther*; and of others fewer, as of *Oyl, Salt, Metals, Minerals, &c.* Now, that there may be some Bodies indivisible by Fire, is, I think, demonstrable. For how doth or can Fire be conceived to divide, one can hardly imagine any other way than by its small Parts, by reason of their violent Agitation insinuating themselves into Compound Bodies, and separating their Parts; which allowing, yet still there is a Term of Magnitude, below which it cannot divide, viz. it cannot divide a Body into smaller Parts than those whereof itself is compounded. For taking, suppose, one least Part of Fire, 'tis clear that it cannot insinuate itself into a Body as little or less than itself; and what is true of one, is true of all: I say, we can imagine no other way than this, unless perchance, by a violent Stroke or Shock, the Parts of the Body to be divided, may be put into so impetuous a Motion, as to fall in sunder of themselves into lesser Particles than those of the impellent Body are, which I will not suppose at present. Now, it is possible,  
that

that the Principles of some other Simple Bodies may be as small as the Particles of Fire. But however that be, it is enough, if the Principles of Simple Bodies be, by reason of their perfect Solidity, naturally indivisible. Such a simple Body, I suppose, Water separated from all heterogeneous Mixtures to be: And consequently the same Quantity thereof that was at first created, doth still remain, and will continue always in Despight of all natural Agents, unless it pleases the Omnipotent Creator to dissolve it. And therefore there can be no Desiccation of the Seas, unless by turning all its Water into Vapour, and suspending it in the Air, which to do, what an immense and long-continuing Fire would be requisite? to the Maintenance whereof all the inflammable Materials near the Superficies of the Earth would not afford Fuel enough. The Sun, we see, is so far from doing it, that it hath not made one Step towards it these four thousand Years, there being in all Likelihood as great a Quantity of Water in the Ocean now, as was immediately after the Flood: And consequently there would probably remain as much in it, should the World last four thousand Years longer.

THIS Fixedness and Intransmutability of Principles secures the Universe from Dissolution by the prevailing of one Element over another, and turning it into its own Nature; which otherwise it would be in continual

Danger of. It secures likewise the Perpetuity of all the Species in the World, many of which, if their Principles were transmutable, might by such a Change be quite lost : And lastly, bars the Production or Creation of any new Species, as in the formentioned Treatise I have shewn.

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## CHAP. VI.

*Containing an Answer to the Second Question, Whether shall this Dissolution be effected by natural or by extraordinary Means, and what they shall be ?*

2.



AS to the Second Question, Whether shall this Dissolution be brought about and effected by natural or by extraordinary Means and Instruments, and what those Means and Instruments shall be? I answer in brief, That the Instrumental Efficient of this Dissolution shall be natural. For it is clear, both by Scripture and Tradition, and agreed on all hands, that it shall be that Catholick Dissolvent, *Fire*. Now, to the Being and Maintenance of Fire, there are four Things requisite. 1. The active Principle of *Aether*. 2. *Air*;

or

or a Nitrous *Pabulum* received from it : These two being commixt together, are every where at hand. 3. *Fewel*, which, considering the Abundance of combustible Materials, which are to be found in all Places upon or under the Surface of the Earth, can nowhere be wanting. 4. The Accension, and the sudden and equal Diffusion of this Fire all the World over. And this must be the Work of God, extraordinary and miraculous.

- Such a Dissolution of the World might indeed be effected by that natural Accident mentioned in the Answer to the precedent Question, *viz.* The Eruption of the Central Fire. But because it is doubtful, whether there be any such Fire in the Middle of the Earth or no; and if there ever were, it is hard to give an Account, how it could be maintained in that infernal Dungeon for want of Air and Fewel. And, because, if it should break forth into the Consistency of a thin Flame, it would in all Likelihood speedily like Lightning mount up to Heaven, and quite vanish away; unless we could suppose Floods, nay Seas of melted Materials, or liquid Fire, enough to overflow the whole Earth, to be poured forth of those Caverns. For these Reasons I reject that Opinion, and do rather think that the Conflagration shall be effected by a superficial Fire. Tho' I must confess we read in *Tacitus, Annal.* 13. at the

End, of a Sort of Fire that was not so apt to disperse and vanish. '----- The City of  
 ' the *Inbonians* in *Germany* (saith he) confes-  
 ' derate with us was afflicted with a sudden  
 ' Disaster; for Fires issuing out of the Earth,  
 ' burned Towns, Fields, Villages every  
 ' where, and spread even to the Walls of a  
 ' Colony newly built, and could not be ex-  
 ' tinguished, neither by Rain nor River-Wa-  
 ' ter, nor any other Liquor that could be  
 ' employed, until for want of Remedy, or  
 ' Anger of such a Distraction, certain Pea-  
 ' sants cast Stones afar off into it; then the  
 ' Flame somewhat slackning, drawing near,  
 ' they put it out with Blows of Clubs, and  
 ' other like, as if it had been a wild Beast:  
 ' Last of all, they threw in Cloaths from  
 ' their Backs, which the more worn and  
 ' fouler they were, the better they quenched  
 ' the Fire." I use *Dr. Hakewill's* Transla-  
 tion.





C H A P. ♦VII.

*The Third Question answered, Whether shall this Dissolution be gradual and successive, or momentaneous and sudden?*

3. **T**HE Third Question is, *Whether shall this Dissolution be gradual and successive, or momentaneous and sudden?*

I ANSWER, The Scripture resolves for the latter, *The Day of the LORD shall come as a Thief in the Night*: A Similitude we have often repeated in Scripture, as in the tenth Verse of this Chapter, in *1 Thess. xv. 2. Rev. iii. 3. and xvi. 15.* And the Resurrection and Change of Things, it is said, *shall be in a Moment, in the Twinkling of an Eye, 1 Cor. xv. 52.* Consonant whereto both the *Epicureans* and *Stoicks* held their Dissolutions of the World should be sudden and brief, as *Lucretius* and *Seneca*, in the Place forementioned, tell us. And it is suitable to the Nature of Fire to make a quick Dispatch of Things, suddenly to consume and destroy.

AND as it shall be sudden, so also shall it be unexpected, being compared to the Coming of the Flood in the Days of *Noah*, *Mat. xxiv. 37, 38, 39.* But as the Days of *Noah* were,

so shall also the Coming of the Son of Man be. For as in the Days that were before the Flood, they were eating and drinking, marrying and giving in Marriage, until the Day that Noah entred into the Ark; And knew not until the Flood came and took them all away; so shall also the Coming of the Son of Man be. And the raining of Fire and Brimstone upon Sodom. Luke xvii. Thessal. v. 3. For when they shall say Peace and Safety, then sudden Destruction cometh upon them as Travail upon a Woman with Child. Now, if it shall be thus sudden and unexpected, it is not likely there should be in Nature any manifest Tendency to it, or remarkable Signs and Fore-runners of it: For such must needs startle and awaken the World into an Expectation and Dread of it. That there is at present no such Tendency to Corruption, but that the World continues still in as good State and Condition as it was two thousand Years ago, without the least Impairment or Decay, hath been, as we before noted, without any Possibility of Contradiction, clearly made out and demonstrated, by Dr. Haketwill in his Apology: And therefore, arguing from the past to the future, it will in all Likelihood so continue two thousand Years more, if it be so long to the Day of Doom; and consequently that Day (as the Scripture predicts) will suddenly and unexpectedly come upon the World. But if all these Prophecies (as Dr. Hammond affirms)

affirms) be to be restrained only to the Destruction of *Jerusalem*, and the *Jewish* Polity, without any farther Respect to the End of the World, then indeed from thence we can make no Inferences or Deductions in reference to that final Period.



# C H A P. VIII.

*The Fourth Question Resolved, Whether shall there be any Signs or Fore-runners of the Dissolution of the World?*

4. THE Fourth Question is, Whether shall there be any Signs or Fore-runners of the Dissolution of the World?

IN order to the Answering of this Question, we shall distinguish Signs into Natural and Arbitrarious.

I. NATURAL Signs, so the *Aurora*, or Dawning of the Day, is a Sign of the Sun-Rising. Now, if the Dissolution be effected in the Course of Nature, and by Natural Means, there will be some previous natural Signs of it. An old House will threaten Ruin before it falls. The natural Death of Men, and all Animals, hath its Harbingers, and old Men before their Dissolution feel the Impres-

Impressions of Age; and proclaim to the World their approaching Fate, by Wrinkles, Gray Hairs, and Dimness of Sight. But we have formerly shewn, That there is no Consecnescency or Declension in Nature; but that the World continues still as firm and staunch as it was three thousand Years ago; and why hereafter it should founder and decay more than it hath done for so many Ages heretofore, what Reason can be given? It is not therefore likely there should be any natural Signs of the Dissolution of the World, and consequently that it shall be effected by natural Means.

2. THERE are *Arbitrary Signs*, as a Garland hung out is a Sign of Wine to be sold. Now, if the Dissolution of the World be effected by Supernatural and Extraordinary Means, (as is most likely) the Signs of it must be arbitrary. For though they may be natural Effects and Productions, yet would they not signify the Destruction of the World, if they were not ordered by Providence to happen at that time, and predicted as Fore-runners of it; with which otherwise they have no natural Connexion. Such Signs are *Matth. xxiv.* the Sun being darken'd, and the Moon not giving her Light, and the Stars falling from Heaven, and the Shaking of the Powers of Heaven. These, and many other Signs of His Coming, we find mentioned in Scripture; but what the Meaning of these

Ex-

Expressions may be, is not so clear. For though some of them may be taken in a literal Sense, yet it is manifest that others cannot. The Sun may indeed be so covered with a *Macula*, as to be quite obscured; and thereupon the Moon necessarily lose her Light, which she borrows only from the Sun-Beams: But how the Stars should in a literal Sense fall down from Heaven, is inconceivable; it being almost demonstratively certain, that most of them are bigger than the whole Earth. We may therefore, keeping as near as we can to the Letter, thus interpret them. There shall be great Signs in Heaven, dismal Eclipses and Obscurations of the Sun and Moon; new Stars and Comets shall appear, and others disappear, and many fiery Meteors be suspended in the Air. The very Foundations of the Earth shall be shaken, and the Sea shall roar and make a Noise. But I must not here dissemble a great Difficulty: How can such illustrious Signs and Fore-runners be reconciled to the Suddenness and Unexpectedness of CHRIST'S Coming, and the End of the World? *Luke xxi. 25.* After the Evangelist had told us, *That there shall be Signs in the Sun, and in the Moon, and in the Stars, ----- the Sea and the Waves roaring;* he adds, as a Consequence thereof, *Ver. 26. Mens Hearts failing them for Fear, and for looking after those Things that are coming on the Earth.* And, indeed,


indeed, how could any Man possibly be buried in so profound a Lethargy of Senselessness and Security, as by such stupendous Prodigies not to be rowzed and awakened to an Expectation of some dismal and tremendous Event? How could he sing a *Requiem* to his Soul, and say Peace and Safety, when the World so manifestly threatens Ruin about his Ears? For the reconciling of these Expressions to this sudden Coming of our Saviour to Judgment, it were most convenient to accept them in the Figurative and Metaphorical Sense. For if we understand them of the Ruin and Devastations of Cities and Countries, and Changes of Governments, the Subversions of Kingdoms and Commonwealths, the Falls and Deposings of Princes, Nobles, and great Men; these happening more or less in every Age, tho' the serious and inquisitive Christian, who searches and understands the Scriptures, may discern them to be the Signs of the World's *Catastrophe*; yet the careless and inconsiderate, the vicious and voluptuous are not like to be at all startled or moved at them, but may notwithstanding, looking upon them as ordinary and insignificant Accidents, *dormire in utramque aurem*, sleep securely till the last Trump awaken them. Or it may be answered, That these Prophecies do belong to the Destruction of *Jerusalem* only, and so

so we are not concerned to answer that Objection.

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# C H A P. IX.

*The Fifth Question answered; At what Period of Time shall the World be dissolved?*

5.  H E Fifth Question is, At what Period of Time shall the World be dissolved? I answer, This is absolutely uncertain and undeterminable. For, since this Dissolution shall be effected by the extraordinary Interposition of Providence, it cannot be to any Man known, unless extraordinarily revealed. And our Saviour tells us, *That of that Day and Hour knoweth no Man, no not the Angels of Heaven, &c. Matth. xxiv. 36.* And again, *Acts i. 17. It is not for us to know the Times and the Seasons, which the Father hath placed in his own Power.* And this Dr. Haketwill brings as an Argument, that the World decays not, neither tends to Corruption; because, if it did, the Time of its actual Dissolution might be collected and foretold; which, *saith he, the Scripture denies.* We may invert this Argu-

Argumentation, and inferr, Because the World doth not decay, therefore the Time of its Dissolution cannot be known.

BUT yet, notwithstanding this, many have ventured to foretell the Time of the End of the World, of whom some are already confuted, the Term prefixt being past, and the World still standing. *Lactantius*, in his Time, said, *Instit. lib. 7. cap. 25. Omnis expectatio non amplius quam ducentorum videtur annorum*; The longest Expectation extends not farther than Two hundred Years. The Continuance of the World more than a Thousand Years since, convinces him of a gross Mistake. *Paulus Grebnerus*, a high Pretender to a Spirit of Prophecy, sets it in the Year 1613, induced thereto by a fond Conceit of the Numeral Letters in the *Latin Word Judicium*. Other Enthusiastical Persons of our own Country have placed it in the Years 1646, and 1656. The Event shews how ungroundedly and erroneously. Others there are, whose Term is not yet expired, and so they remain still to be confuted. As those who conceit, that the End of the World shall be when the Pole-Star shall come to touch the Pole of the *Equator*, which (say they) ever since the Time of *Hipparchus*, hath approached nearer and nearer to it. That it doth so, I am not satisfied; but if it doth, it is merely Accidental, and hath no Connexion with the End of the World. But the

*Du Moulin.*



the most famous Opinion, and which hath found most Patrons and Followers, even amongst the Learned and Pious, is that of the World's Duration for Six thousand Years. For the strengthening of which Conceit, they tell us, That as the World was created in six Days, and then followed the Sabbath, so shall it remain Six thousand Years, and then shall succeed the Eternal Sabbath. *Heb. iv. 9.*

*\* Ἀρα ἀπολείπεται Σαββατισμὸς, &c. There remains, therefore, a Rest or Sabbath to the People of God.* Here we see, that the Apostle institutes a Comparison between the heavenly Rest and the Sabbath. Therefore, as God rested upon the Seventh Day, so shall all the World of the Godly rest after the Six Thousandth Year. *For he that hath entred into his Rest, ceaseth from all his Works, as God did from His.* Of this Opinion were many of the Ancient Fathers, \*as I shewed before, grounding themselves upon this Analogy between the Six Days of the Creation and the Sabbath; and the Six Thousand Years of the World's Duration, and the Eternal Rest: For, saith *Irenæus* in the Place before quoted, *Hoc autem, (that is, the History of the Six Days Creation, and succeeding Sabbath) est & præteritorum narratio, & futurorum prophetia. Dies enim unus mille annos significat, sicut Scriptura testatur: 2 Pet. iii. 8. Psal. xc. 4.* The Scriptures reckoning Days of One thousand Years long, as in *Verse 8.* of this

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this Chapter, and in *Psal.* xc. 4. This is likewise a received Tradition of the *Jewish Rabbins*, registred in the *Talmud*, in the Treatise *Sanhedrim*, delivered (as they pretend) by the Prophet *Elias* the *Tisbbite* to the Son of the Woman of *Sarepta*, whom he raised from the Dead, and by him handed down to Posterity. I rather think with *Reuterus*, that the Author of it was some *Rabbi* of that Name. The Tradition is, *Sex millia annorum erit mundus : & uno millenario vastatio, i. e. Sabbathum Dei : Duo millia inane : Duo millia Lex : Duo millia dies Messia.* Two thousand Years Vacuity : Two thousand Years of the Law : Two thousand Years the Days of the Messiah. But they shoot far wide : For, according to the least Account, there passed a far greater Number of Years before the Law was given, 2513; saith *Reuterus* ; and, on the contrary, less Time from the Law to the Exhibition of the Messiah. All these Proofs laid together, do scarce suffice to make up a Probability. Neither do those Rabbinical Collections from the six Letters in *בראשית* the first Word of *Genesis*, or from the six *Alephs* in the first Verse of that Book, each signifying a Thousand Years ; or from the Six first Patriarchs in the Order of the Genealogy to *Enoch*, who was caught up to Heaven, and found no more; add much Weight to this Opinion. *S. Austin* very modestly concludes, after a Discussion of this

Point

Point concerning the World's Duration ; *Ego tempora dinumerare non audeo : Nec aliquem Prophetam de hac re numerum annorum existimo præfinivisse. Nos ergo, quod scire nos Dominus noluit, libenter nesciamus.* I dare not calculate and determine Times : Neither do I think, that concerning this Matter, any Prophet hath predicted and defined the Number of Years. What therefore the LORD would not have us to know, let us willingly be ignorant of.

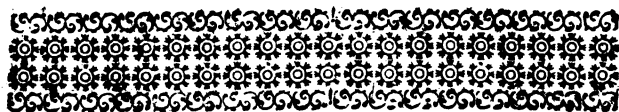
BUT though none but presumptuous Persons have undertaken peremptorily to determine that Time, yet was it the common and received Opinion and Persuasion of the Ancient Christians, that that Day was not far off : And had they been to limit it, they would hardly have been induced to set the Term so forward and remote from their own Age, as by Experience we find it proves to be, but in their own Times, or shortly after : And many Places of Scripture seem to favour that Opinion ; so that some have presumed to say, That the Apostles themselves were at first mistaken in this Particular, till after farther Illumination they were better informed. But though this be too bold a Conceit, yet that the Churches, at least some of them, did at first mistake the Apostles Meaning, in their Sermons and Epistles concerning this Point, and so understand them, as to think that the End of the World and

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Final


Final Judgment was at hand, appears from 2 *Thess.* ii. 2. *I beseech you, Brethren, that ye be not soon shaken in Mind, or be troubled, neither by Spirit, nor by Word, nor by Letter, as from us, as that the Day of CHRIST is at hand.* We see the Apostle labours to rectify, and for the future to prevent this Mistake: So, likewise, the Apostle *Peter*, in the 8th and 9th Verses of this Chapter. And yet this Opinion had taken such deep Root in them, that it was not easy to be extirpated; but continued for some Ages in the Church. Indeed, there are so many Places in the New Testament which speak of the Coming of CHRIST as very near, that if we should have lived in their Time, and understood them all as they did, of His Coming to judge the World, we could hardly have avoided being of the same Opinion. But if we apply them (as *Dr. Hammond* doth) to His Coming to take Vengeance on His Enemies, then they do not hinder, but that the Day of Judgment, I mean the General Judgment, may be far enough off. So I leave this Question unresolved, concluding, that when that Day will come GOD only knows.





## C H A P. X.

*How far this Conflagration shall extend.*

6.  **SIXTH** Question is, How far shall this Conflagration extend? Whether to the Ethereal Heavens, and all the Host of them, Sun, Moon, and Stars, or to the Aereal only?

**I ANSWER,** If we follow ancient Tradition, not only the Earth, but also the Heavens and heavenly Bodies will be involved in one common Fate, as appears by those Verses quoted out of *Lucretius, Ovid, Lucan, &c.*

**OF** Christians some exempt the Ethereal Region from this Destruction; for the two following Reasons, which I shall set down in *Reuterus's* Words: 1. 'Because in this Chapter the Conflagration is compared to the Deluge in the Time of *Noah*. But the Deluge extended not to the upper Regions of the Air, much less to the Heavens, the Waters arising only fifteen Cubits above the Tops of the Mountains, if so much. Therefore neither shall the Conflagration transcend that Term." So *Beza*, upon 2 Pet. iii. 6. *Tantum ascendet ille ignis quantum aqua altior supra omnes montes. That Fire shall ascend as high as the Waters stood above the*

*Mountains.* This Passage I do not find in the last Edition of his Notes. The ordinary Gloss also upon these Words, 2 Thess. i. 2. *In flaming Fire rendring Vengeance,* saith, *Christum venturum præcedet ignis in mundo, qui tantum ascendet quantum aqua in diluvio.* There shall a Fire go before CHRIST when He comes, which shall reach as high as did the Water in the Deluge. And S. Augustin De Civit. Dei lib. 20. cap. 18. *Petrus etiam commemorans factum ante diluvium, videtur admonuisse quodammodo, quatenus in fine hujus seculi istum mundum peritulum esse credamus.* Peter also mentioning the ancient Deluge, seems in a manner to have advised us how far, at the Consummation of Time, we are to believe this World shall perish.

BUT this Argument is of no Force, because it is not the Apostle's Design in that Place to describe the Limits of the Conflagration, but only against Scoffers, to shew, that the World should one Day perish by Fire, as it had of old been destroyed by Water.

2. THE second Reason is, 'Because the heavenly Bodies are not subject to Passion, Alteration, or Corruption. They can contract no Filth, and so need no Expurgation by Fire.

To this we answer, not in the Words of Reuter, but our own; That it is an idle and ill-grounded Conceit of the *Peripateticks*, That the Heavenly Bodies are of their own Nature

Nature incorruptible and unalterable: For on the contrary it is demonstrable, that many of them are of the same Nature with the Earth we live upon, and the most pure, as the Sun, and probably too the fix'd Stars, suffer Alterations; *maculae*, or opaque Concretions being commonly generated and dissolved in them. And *Comets* frequently, and sometimes *New Stars*, appear in the Ethereal Regions. So that these Arguments are insufficient to exempt the Heavens from Dissolution; and on the other side, many Places there are in Scripture which seem to subject them thereto: As *Psal. cii. 25, 26.* recited *Hebr. i. 10.* which hath already often been quoted, *The Heavens are the Works of Thy Hands; They shall perish.* *Matth. xxiv. 35.* *Heaven and Earth shall pass away.* *Isa. lxxv. 17.* and *li. 6.* *The Heavens shall vanish away like Smoke.* Yet am I not of Opinion, that the last Fire shall reach the Heavens; they are too far distant from us to suffer by it: Nor indeed doth the Scripture affirm it; but where it mentions the Dissolution of the Heavens, it expresseth it by such Phrases as seem rather to intimate, that it shall come to pass by a Consenescency and Decay, than be effected by any sudden and violent Means. *Psal. cii. 25, 26.* *They all shall wax old as doth a Garment, &c.* Though I confess nothing of Certainty can be gathered from such Expressions: For we find the

same used concerning the Earth, *Isa. li. 6.*  
*The Heavens shall vanish away like Smoke,*  
*and the Earth shall wax old as doth a Gar-*  
*ment.* The Heavenly Bodies are none of  
 them uncorruptible and eternal; but may  
 in like manner as the Earth be consumed and  
 destroyed, at what Times, and by what  
 Means, whether Fire, or some other Element,  
 the Almighty hath decreed and ordered.



## C H A P. XI.

*Whether shall the whole World be con-*  
*sumed and annihilated, or only refined*  
*and purified?*

\*\*\*\*\* HERE remains now only the Se-  
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 venth Question to be resolved,  
 Whether shall the World be whol-  
 ly consumed, burnt up and de-  
 stroyed, or annihilated; or only refined, pu-  
 rified, or renewed? To this I answer, That  
 the latter Part seems to me more probable,  
*viz.* That it shall not be destroyed and an-  
 nihilated, but only refined and purified. I  
 know what potent Adversaries I have in  
 this Case. I need name no more than *Ge-*  
*vard* in his *Common Places*, and *Dr. Hake-*  
*will* in his *Apology*, and the Defence of it,  
 who



who contend earnestly for the Abolition or Annihilation. But yet upon the whole Matter, the Renovation or Restitution seems to me most probable, as being most consonant to Scripture, Reason, and Antiquity. The Scripture speaks of an ἀποκατάστασις, or Restitution, Acts iii. 21. *Whom the Heavens must contain until the Time of the Restitution of all Things*; speaking of our Saviour: and παλιγγενεσία, or Regeneration of the World, the very Word the Stoicks and Pythagoreans use in this Case, Matt. xix. 28, 29. *Verily, I say unto you, That ye which have followed me, in the Regeneration, when the Son of Man shall sit on the Throne of His Glory, ye also shall sit upon twelve Thrones, &c.* Psal. cii. 26. *As a Vesture shalt thou change them, and they shall be changed.* Which Words are again taken up and repeated, Heb. i. 12. Now it is one thing to be changed, another to be annihilated and destroyed. 1 Cor. vii. 31. παύει τὸ σχῆμα τῆ κόσμος τῆς, *The Fashion of this World passeth away.* As if he had said, It shall be transfigured, or its outward Form changed, not its Matter or Substance destroyed. Isa. lxv. 17. *Behold I create new Heavens and a new Earth, and the former shall not be remembered, nor come into Mind.* Isa. lxvi. 22. *As the new Heavens and new Earth, which I shall make, shall remain before me.* To which Places the Apostle Peter seems to refer in those Words, 2. Pet. iii. 13.

Nevertheless we, according to His Promise, look for new Heavens, and a new Earth, wherein dwelleth Righteousness. This new Heaven and new Earth we have also mentioned, Rev. xii. 1. *And I saw a new Heaven and a new Earth; for the first Heaven and the first Earth were passed away, and there was no more Sea.* These Places, I confess, may admit of an Answer or Solution by those who are of a contrary Opinion, and are answered by Doctor *Hakewill*: yet all together, especially being back'd by ancient Tradition, amount to a high Degree of Probability. I omit that Place, Rom. viii. 21, 22. *The Creature itself also shall be delivered from the Bondage of Corruption, into the glorious Liberty of the Sons of GOD*: Tho' it be accounted the strongest Proof of our Opinion, because of the Obscurity and Ambiguity thereof.

2. FOR Antiquity, I have already given many Testimonies of the ancient Fathers and Doctors of the Church, and could, if Need were, produce many more, the whole Stream of them running this way. And tho' Dr. *Hakewill* saith, That if we look back to higher Times before S. *Hierom*, we shall not easily find any one who maintained the World's Renovation; yet he hath but two Testimonies to alledge for its Abolition; the one out of *Hilary* upon the Psalms, and the other out of *Clemens* his *Recognitions*. To this Restitution of the World, after the Conflagration,

Migration, many also of the Heathen Philosophers bear Witness, whose Testimonies Mr. Burnet hath exhibited in his *Theory of the Earth*, lib. 4. cap. 5. Of the Stoicks; Chrysippus de Providentiâ, speaking of the Renovation of the World, saith, Ἡμᾶς, μετὰ

Apud  
Iasam.  
l. 7. c. 23.

τὸ τελευτῆσαι, πάλιν περιόδων τινῶν εἰλημμένων χρόνῳ, εἰς ὃ νῦν ἐσμέν ἀποκαταστήσεσθαι σχῆμα.

*We, after Death, certain Periods of Time being come about, shall be restored to the Form we now have.* To Chrysippus Stobæus adds

Zeno and Cleanthes, and comprehends together with Men all natural Things, Ζήνωνι, καὶ

Κλεάνθει, καὶ Χρυσίπῳ ἀρέσκει τὴν εἰάν μεταβάλλειν, οἷον εἰς σπέρμα, τὸ πῦρ καὶ πάλιν ἐκ

τέττε τοιαύτην ἀποτελεῖσθαι τὴν διακόσμησιν οἷα πρότερον ἦν. Zeno, and Cleanthes, and Chry-

sippus, were of Opinion, That the Nature or Substance of Things changes into Fire, as it

were into a Seed; and out of this again, such a World or Frame of Things is effected

as was before. This Revolution of Nature, Antoninus, in his Meditations, often calls

τὴν περιοδικὴν παλιγγενεσίαν τῶν ὄλων, *The Periodical Regeneration of all Things.* And \* Origen, \* Lib. 5.

against Celsus, saith of the Stoicks in general, Φασὶ ὅ οἱ ἀπὸ τῆς Στοᾶς κατὰ περίοδον ἐκπύρῳσιν

τῷ παντὸς γίνεσθαι, καὶ ἐξῆς αὐτῇ διακόσμησιν πάντ' ἀπαράλλακτα ἔχουσιν ὡς πρὸς τὴν ἑτέραν

διακόσμησιν. The Stoicks say, That at certain Periods of Time there is a Conflagration of the

Universe; and after that a Restitution thereof

having

having exactly the same Disposition and Furniture the former World had. More to the like Purpose concerning the Stoicks, we have in \* Eusebius out of Numenius. Nature, saith he, returns εἰς τὴν ἀνάσασιν ἐκείνην τὴν ποίῃσαν ἐναυτὸν τὸν μέγιστον, καθ' ὃν ἀπ' αὐτῆς μόνῃς εἰς αὐτὴν πάλιν γίνεται ἡ ἀποκατάστασις ἐπανελθούσα ἢ κατὰ τάξιν ἀφ' οἷας διακοσμεῖν ὡσαύτως ἤρξατο, κατὰ λόγον πάλιν τὴν αὐτὴν διεξαγωγὴν ποιεῖται, τῶν τοιούτων περιόδων ἐξ αἰδῖς γενομένων ἀκαταπαύσως, to the Resurrection which makes the great Year, wherein there is again a Restitution made from itself alone to itself. For returning according to the Order wherein it began first to frame and dispose Things, (as Reason would) it again observes the same OEconomy or Administration; the like Periods returning eternally without ceasing. He that desires more Authorities of the Heathen Philosophers and Poets, in Confirmation of the World's Restitution after the Conflagration, may consult the same Mr. Burnet in the Place forequoted; where he also shews, that this Doctrine of the Mundane Periods was received by the Grecians from the Nations they call Barbarous. Pythagoras, saith Porphyry, brought it first into Greece: And Origen witnesseth of the Egyptian Wise Men, that it was delivered by them. Laertius out of Theopompus relates, That the Persian Magi had the same Tradition; and Berosus saith, that the Chaldeans also. In fine, among all the barbarous Na-

\* Pref.  
Euseb.  
l. 15.

Nations, who had among them any Person or Sect, and Order of Men, noted for Wisdom or Philosophy, this Tradition was current. The Reader may consult the Book we refer to, where is a notable Passage taken out of *Plutarch's* Tractate, *De Iside & Osiride*, concerning a War between *Oromazes* and *Arimanius*, somewhat parallel to that mentioned in the Revelation between, *Michael* and the *Dragon*.

3. THE Restitution of the World seems more consonant to Reason than its Abolition. For if the World were to be annihilated, what needed a Conflagration? Fire doth not destroy or bring things to nothing, but only separate their Parts. The World cannot be abolished by it, and therefore had better been annihilated without it. Wherefore the Scripture mentioning no other Dissolution than is to be effected by the Instrumentality of Fire, it's clear, we are not to understand any utter Abolition or Annihilation of the World, but only a Mutation and Renovation, by those Phrases of *perishing*, *passing away*, *dissolving*, *being no more*, &c. They are to be no more in that State and Condition they are now in.

2. THERE must be a material Heaven, and a material Hell left. A Place for the glorified Bodies of the Blessed to inhabit and converse in; and a Place for the Bodies of the Damned, a *Κολασηριον*, or Prison for them to be shut up in. Now, if the Place of the Blessed

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Blessed be an Empyrean Heaven far above these visible Heavens, as Divines generally hold; and the Place of the Damned be beneath, about the Middle of the Earth; as is the Opinion of the School-Men, and the Church of *Rome*, and as the Name *Inferi* imports, and as the ancient Heathen described their *Tartarus*,

Hom. II.

----- εἰς τάρταραν ἡερέοντα  
 Τῆλε μάλ' ἤχι βάθισον ὑπὸ χθονός ἐσι βέρεθρον,  
 Τόσσον ἔνερθ' Αἰδεω ὅσον ἔρανος ἐς' ἀπὸ γαίης.

Then when all the intermediate Bodies shall be annihilated, what a strange Universe shall we have? consisting of an immense Ring of Matter, having in the Middle a vast Vacuity, or Space void of all Body, save only one small Point for an infernal Dungeon. Those that are of this Opinion have too narrow and mean Thoughts of the Greatness, I had almost said Immensity of the Universe, the glorious and magnifick Products of the Creator's Almighty Power; and are too partial to themselves, to think the whole World was created for no other End but to be serviceable to Mankind: But of this I have said somewhat in a former Discourse, and therefore shall not at present enlarge upon it.

BUT let us hear what they have to say for the *Abolition*.

Hakewill's  
 Apol. l. 4.  
 c. 13. f. 5.

THEIR first and most weighty Argument is taken from the *End of the World's Creation*, which

which was partly and chiefly the Glory of the *Creator*, and partly the Use of Man, the Lord Deputy, as it were, or *Viceroy* thereof. Now for the *Glory* of the *Creator*, it being by the admirable Frame of the World manifested unto Man, Man being removed out of the World, and no Creature being capable of such a Manifestation besides him, we cannot imagine to what Purpose the Frame itself should be left, and restored to a more perfect Estate. The other *End*, being for *Man's Use*, either to supply his Necessity in Matter of Diet, of Physick, of Building, of Apparel; or for his Instruction, Direction, Recreation, Comfort and Delight; or lastly, that therein, as in a Looking-glass, he might contemplate the Wisdom, the Goodness and Power of *GOD*; when he shall attain that blessed Estate, as he shall have no farther Use of any of these, enjoying perfect Happiness, and seeing *GOD* as He is, Face to Face, the second or subordinate End of the World's Being must needs be likewise frustrate. And what other End can be given or conceived for the remaining or restoring thereof? &c.

To this I answer, there may be an End of the restoring of the World, tho' we are not able to find out or determine what. We are too short-sighted to penetrate the Ends of *GOD*. There may be a new Race of rational Animals brought forth to act their Parts upon this Stage, which may give the Creator

tor as much Glory as Man ever did or could. And yet if there should be no material and visible rational Creature made to inhabit the Earth, there are spiritual and intellectual Beings, which may be as busy, and as much delighted in searching out, and contemplating the Works of GOD in this new Earth, and rendring Him the Praise of His Wisdom and Power as Man could be. These Things we may conjecture; but we must leave it to the only wise GOD to determine what Use shall be made of it. It seems to me to be too great Presumption, and over-valuing ourselves, to think that all this World was so made for us, as to have no other End of its Creation, or that GOD could not be glorified but by us.

THIS first and principal Argument being answered, the second admits of an easy Solution. They enquire whether the Vegetables, and Creatures endued with Sense, shall all be restored, or some only? namely such as shall be found in Being at the Day of Judgment. If all, where shall we find Stowage for them? Surely we may in this case properly apply that which the Evangelist in another useth figuratively, if they should all be restored, even the World itself could not contain the Things which should be restored. If some only, then would I gladly know, why those some should be vouchsafed this great Honour, and not all, or how those  
Creatures



Creatures without a Miracle shall be restrain'd from propagating and multiplying, and that infinitely in their Kinds by a perpetual Generation. Or lastly, How the several Individuals of these Kinds, shall, contrary to their Primitive Natures, live and dure immortally?

To all this I answer, That not only all Animals, but all Vegetables too, yea, and their Seeds also, will doubtless be mortified and destroyed by the Violence of the Conflagration; but that the same should be restored, and endued with eternal Life, I know no Reason we have to believe; but rather that there should be new ones produced, either of the same with the former, or of different Kinds, at the Will, and by the Power of the Almighty Creator, and for those Ends and Uses for which He shall design them. This Question being answered in this Manner, all that follows concerning the Earth remaining without any Furniture or Inhabitants, &c. falls to the Ground. So I have dispatch'd these Seven Questions concerning the Dissolution of the World, there remains now only the Inference or Use of the precedent Doctrine.



## C H A P. XII.

### *The Apostle's Inference from the precedent Doctrine.*

**C**OME now to the *Inference* the Apostle makes from the precedent Doctrine, *What manner of Persons ought we to be in all holy Conversation and Godliness?* One Word here needs a little Explication, and that is *Holy*. What is meant by a *holy Conversation*?

**HOLINESS** is an Equivocal Term. It is attributed either to **GOD**, or to the Creature. When it is attributed to **GOD**, it signifies either,

1. **THE** unspotted Purity of His Nature, and the constant and immutable Rectitude of His Will. So it is taken, *1 John iii. 3. And every Man that hath this Hope in him, purifieth himself as He is pure: And, 1 Pet. i. 15. As He, which called you, is Holy, so be ye Holy in all manner of Conversation; because it is written, Be ye Holy, for I am Holy. Psal. cxlv. 17. The LORD is Righteous in all His Ways, and Holy in all His Works.*

2. **HIS** Sovereign Majesty and Greatness appearing in His transcendent Wisdom and Power, in His Supreme and Absolute Dominion

nion over all things: In respect whereof, He is called the *Holy One of Israel*, and His Name is said to be *Holy*: That is, to be invoked with the greatest Reverence. *Holy and Reverend is His Name*. Because of this His Greatness and Excellency, He is to be worshipped, and adored with the most submissive Humility and Veneration, with a transcendent and incommunicable Worship and Devotion.

WHEN Holiness is attributed to Creatures, it signifies either an Inherent and Inward, or a Relative or Outward, Holiness.

1. INHERENT or Inward Holiness is a Conformity of Heart and Life to the Will of GOD: Or, as \* others define it, An habitual Frame of Mind: Whereby we are fitted for Vertuous Actions, but more especially for the Duties of Religion. Indeed, Holiness doth always include a Reference to GOD.

\* Bishop  
Wilkins's  
Univers.  
Character.

2. RELATIVE or Outward Holiness results from a Separation and Setting apart any thing from a prophane and common, and applying it to a sacred or religious Use. For, the Majesty of God, who at first created, and continually sustains and governs all things, being so great and inviolable, all Persons, Things, and Times, and Places, and Ceremonies, separated and appropriated to His Service and Worship, are by all Nations esteemed Sacred, and to have a Character of Holiness imprinted on them.

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By Holiness, in this Place, is to be understood an *inherent* Holiness, which is well defined by Dr. Outram, *A Conformity of Heart and Life to the Will of God*. I shall not discourse at large concerning a holy Conversation, nor instance Particulars wherein it consists. That would be to write a Body of Practical Divinity. I shall, therefore, at present, suppose the Reader sufficiently instructed in that. My Business shall be to shew the Strength of the Apostle's Inference.

It may be said, How doth this Dissolution concern us, who may, perchance, be dead and rotten a Thousand Years before it comes? What have we to do with it?

I ANSWER, It concerns us, 1. Because, it's possible, it may happen in our Times; it may surprize us before we are aware. The precise Time thereof is uncertain. And it shall be sudden and unexpected, *coming as a Thief in the Night*, as we have before shewn: Therefore, we ought always to be upon our Guard, *to have our Loins girt about, and our Lights burning*. This Use the Scripture, in many Places, makes of the Uncertainty of the Time of CHRIST'S Coming, *Luke xii. 40. Be ye therefore ready: For the Son of Man cometh at an Hour when ye think not. Luke xxi. 34, 35. And take heed to yourselves, lest at any time your Hearts be overcharged with Surfeiting and Drunkenness, and Cares of this Life, and so that Day come upon you*

you unawares. For as a Snare shall it come on all them that dwell on the whole Earth. Parallel whereto are Matth. xxiv. 42. and Mark xiii. 33, 35. That it shall come is certain, when it shall come is uncertain, and it every day draws nearer and nearer; therefore, it is not Wisdom to remove the Evil Day far from us: And as in reference to the Day of Death, it is an usual and prudent Advice, so to live every Day, as if it were our last Day; or at least, as we would not be afraid to do should it be so. Because, we are sure, that one Day will be our last, and, for ought we know, the present may be it. So, likewise, it is rational Counsel, in respect of the End of the World, so to prepare ourselves for it by a holy Conversation, that we may get above the Terror and Dread, which will otherwise attend the Apprehension of the Approach of it; and that we may be provided against the worst that may follow, and be secure from what can come.

Secondly, It concerns us, should it be a Thousand Years to come. Because then is the general Resurrection both of the Just and Unjust, ~~Mat. xxiv. 31~~ and the general Judgment. When we must all appear before the dreadful Tribunal of Christ, that every one may receive the ~~thing~~ <sup>thing</sup> done in his Body, according to that he hath done, whether it be good or bad, ~~1 Cor. vii. 2~~ which, ~~Rom. vii. 12~~ is called the Revelation of the righteous Judg-

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ment of GOD. Who will render to every Man according to his Deeds, &c. Upon this Account, I say, it concerns us much how we have our Conversation here.

- I. *First.* As we hope to be acquitted at that Day, and to enter into those new Heavens, in which dwells Righteousness. Holiness is a necessary Condition, and antecedent to Happiness. Necessary, I say,

1. BY GOD'S Appointment, *Heb. xii. 14. Follow Peace with all Men, and Holiness, without which no Man shall see the LORD.* *Rom. vi. 22. Have your Fruit unto Holiness, and the End Eternal Life.* *Psal. 50. ult. To him that ordereth his Conversation aright, will I shew the Salvation of GOD.* Eternal Life is the Gift of GOD. He is not obliged to bestow it upon any Man. He may make what Condition he pleases for the obtaining of it. No Man hath any Right to it. No Man can lay any Claim to it, but from this Donation, and from the Performance of these Conditions. *Rev. xxii. 14. Blessed are they that do His Commandments; that they may have Right to the Tree of Life, and may enter in through the Gates into the City.* For without are Dogs, and Whoremongers, and Sorcerers, &c. All the Right they have depends upon GOD'S Promise, which is Conditionate, and accrues to them by the Performance of

the Condition, which is the Doing of His Commandments.

2. NECESSARY, not only by GOD's Appointment, but in the very Nature of the Thing. Holiness is the very Quality and Complexion of Heaven. No Man without it is qualified to be a Subject of that Kingdom; For, thereinto nothing that is impure or unclean can enter. Rev. xxi. 27. *And there shall in no wise enter into it [the New Jerusalem] any thing that defileth, neither whatsoever worketh Abomination.* In this new Heaven dwelleth Righteousness, 2 Pet. iii. 15. Therefore, 1 John iii. 3. *Every Man that hath this Hope in Him, purifieth himself as He is pure.* Heaven would naturally spue out and eject a wicked Person, as one heterogengous to it. Heaven and Hell are not more distant in Place, than they are in Nature. There is not more Antipathy between Fire and Water, between Light and Darkness, between Straight and Crooked, neither are they more incompatible, or do more naturally resist and expell one another, than Holiness, which is the Quality of Heaven, or Wickedness, which is the Disposition and Temper of Hell. Some do think Heaven to be rather a State than a Place; and that he that is Partaker of the Divine Nature hath Heaven within him. This is true, but this is not all. The whole Notion of Heaven comprehends both a State and a Place.

Place. A Man must be in a heavenly State, before the local Heaven can receive him; or he brook it. Heaven without him would be no Heaven, to the Man who hath not Heaven within him. A wicked Person could find no Business or Employment in Heaven; nothing to satisfy his corrupt and depraved Affections, Inclinations, and Appetites. He would there meet with no suitable Company; no Persons, whose Conversation he could take any Delight and Complacency in, but rather hate and abhor. *For, what Fellowship hath Righteousness with Unrighteousness? Or, what Communion hath Light with Darkness?* 2 Cor. vi. 14. Like naturally loves Like, and unites with it, and doth refuse, resist, and hate that which is Unlike it. For every thing is made to love itself, and, consequently, whatsoever resembles and comes near it, and is as it were a Replication of it; and to hate the contrary. As, therefore, we would be glad to be Partakers of the Blessedness of the local Heaven, so let us endeavour to get into our Minds and Spirits the Qualities and Conditions of Heaven; that so we may be fit Subjects for that Kingdom, fit Companions for that Society. *This is the Time allowed us to purify ourselves from all Filthiness both of Flesh and Spirit, and to perfect Holiness in the Fear of God.* There is no Invention in the Grave, whither we are going, *Ecc. ix. 10.* Upon this Moment depends Eternity. *As the Tree*



Tree falls, so it lies, Eccles. And as Death leaves, so will Judgment find us. *Quando isthinc excessum fuerit, nullus jam locus penitentiae est. Hic vita aut amittitur, aut tenetur. Hic saluti aeterna cultu Dei & fructu fidei providetur.* Cyprian. Serm. de Immortal. After we shall depart hence, there remains no more Place for Repentance. Eternal Life is here either lost or won. Here Provision is made for everlasting Salvation, by the Worship of God, and Fruit of Faith. We must work while it is Day, the Night [of Death] cometh wherein no Man can work, John ix. 4. And; therefore, the Time our Bodies shall rest in the Grave, should it be a Thousand Years, will little avail us: For, if the Soul be mean while awake, the certain and dreadful Expectation of the Sentence of Condemnation to an eternal Hell at the Day of Judgment, will be little less afflictive than the Torments thereof themselves. I might add, by way of Digression, that Sin and Wickedness is naturally productive of Hell in the Soul. A wicked Man carries Hell in his Breast. Sin necessarily inferrs Misery: It is contrary to the Nature of the Soul; and whatsoever is so, must needs be grievous. Diversion and Non-Attention to his Condition, is the wicked Man's only Security: I have heard it often from a \* great Divine in his Sermons, *That there is but a Thought's Distance between a wicked Man and Hell.* For, do but fix and

\* Doctor.  
Witchcos.

bind his Thoughts to the Consideration of his Life and Actions, and he will anticipate Hell himself, he shall need no infernal Furies to lash him, he will be his own Tormentor : Such a Man's Pressures will be heavy enough, should the Divine *Nemesis* superadd no more. The Reason of this I have given in a former Discourse, and therefore shall now omit what else might have been added on this Particular.

II. *Secondly*, It much concerns us, upon account of the future Judgment which shall be at the Dissolution of the World, to have our Conversation in all Holiness, as we desire to avoid that Shame and Misery which will then otherwise certainly befall us.

1. As we desire to avoid that Shame which will cover our Faces at that Day. If here Shame and Disgrace be more grievous and insupportable than Death itself, what will it be then, when the Soul shall be rendered more quick, and apprehensive, and sensible of such Impressions? There is nothing shameful but Sin, nothing else hath any natural Turpitude in it. Shame follows Sin as the Shadow doth the Body. He that will commit the one, cannot avoid the other. Therefore, such wicked Persons as have not quite renounced Modesty, and lost all Sense of Shame, especially, if guilty of secret Crimes, the Consideration of a future Judgment would be a powerful Curb to restrain them

them from Sin for the future : Because then God will produce and bring to light the hidden Things of Darknes, and disclose and make manifest the Counsels of all Hearts, 1 Cor. iv. 5. Then He will judge the Secrets of Men by JESUS CHRIST, Rom. ii. 16. Then will He bring every Work into Judgment, with every secret thing, Eccles. xii. 14. For, would they but consider and ponder, what Confusion will overwhelm them when this shall be done in the Face of the whole World, and before all that knew them, and they not able to make any Denial, or Excuse : This, I say, if any thing, would be a powerful Curb to withhold them from those Enormities to which this Shame is appendent. It may be thou madest a great Figure in the World for Piety and Religion, wouldst seem to be Some-body in the Eyes of Men, when thou wert false and unsound, didst harbour and nourish some Viper in thy Bosom ;

*Introrsum turpis, speciosa pelle decorus :*

When thy secret Faults shall be exposed before thy Neighbours, and Friends, and Children ; And the Shame of thy Nakedness shall be made appear, Rev. iii. 18. How wilt thou then be confounded and astonished, and unable to lift up thy Head ? What Horror will then seize thee, when thy Confusion shall be continually before thee, and the Shame of thy Face shall cover thee ? Psal. xlv. 15. It concerns

cerns thee, therefore, to look about thee in  
 time, and search thy Conscience to the Bot-  
 tom, to remove whatever grates, to cast out  
 whatever offends, though never so customary,  
 never so pleasing to Flesh and Blood : To  
 apply thyself to the Merits and Satisfaction  
 of CHRIST JESUS, for the Expiation of  
 what is past ; and, for the future, to resolve  
 and endeavour the Amendment of whatso-  
 ever hath heretofore been amiss in thee ;  
 and to beg the Assistance of the Divine  
 Grace to strengthen in thee every good  
 Purpose and Resolution of Heart, and to  
 enable thee to bring it to Issue and Effect.  
 And for thy Security, I think it good Advice,  
 to resolve so to behave thyself in thy Retire-  
 ments, so to live in the Secret of thy Cham-  
 ber and Closet, as though the Doors were  
 thrown open upon thee, and all the Eyes of  
 the World beheld thee ; as though thou  
 were't in the *Arena* of a Publick Theatre,  
 exposed to the View of Men and Angels. I  
 remember the ingenious Writer of Politick  
 Discourses, *Boccalini*, doth often divert him-  
 self and his Reader, with facetious Reflecti-  
 ons upon the Contrivance of a Window into  
 the Breast ; which, if I mistake not, he fa-  
 thers upon *Lipsius*. However he may deride  
 it, I think it would be prudent Counsel to  
 give and take, for every Christian, so to  
 live and carry it in the Secret of his Heart, as  
 if there were a Window into his Breast, that  
 every

every one that passed by, might look in thereat, and see all the Thoughts and Imaginations that passed there; that found any Entertainment or Acceptance with him. For though, indeed, God *searcher the Hearts and Reins, and understandeth our Thoughts as far off*, Psal. cxxxix. 2. Yet such is the Hypocrisy of Mankind, that they do, for the most part, more reverence the Eyes of Men than of God; and will venture to do that in His Presence, which they would be ashamed the Eyes of Man should see them doing. You will say, Is it not better to be modest, than to be impudent? Is it not better to conceal, than to publish one's Shame? Is it not better to reverence Man, than neither God nor Man? Doth not the Scripture condemn a Whore's Fore-head? Is it not a true Proverb, *Past Shame, past Grace?* Was it not good Advice of a Cardinal (as I remember) *Si non caste, tamen caute*? He that hath devoured Shame, what Bridle is there left to restrain him from the worst of Evils? I answer, That it seems indeed to me, that publick Sins of the same Nature, are more heinous than secret; and that Impudence in sinning, is an Aggravation of Sin. For open Sins dare God, and bid Defiance to Heaven, and leave the Sinner unreclaimable, and are of more pernicious Influence. I do not now speak of the Hypocrisy of feigning Holiness to serve our own Ends, which is rightly esteemed *duplex iniquitas*, but

but that of concealing and hiding vicious Actions, to avoid the Shame of Men. And yet, there is a great Obliquity in this too. Because, even this is a slighting and undervaluing of God, a preferring of Man before Him, setting a greater Price and Esteem upon the Praise and Commendation of Men, than the Praise and Approbation of God, *John xii. 43.* God sees the secretest Actions, yea, the most retired Thoughts. They that believe this, and yet make bold to do in His Presence, what the Fear of Man's Eye would restrain them from, it is clear that they reverence Man more than God; a poor, frail, impotent Creature like themselves, more than the most Pure and ever Blessed Creator. Nay, let the Temptation to any Sin be never so strong, and the natural Inclination never so vehement, if the Knowledge and Conscience of Men be a Motive and Consideration powerful enough to enable us to resist and repell them, had we but as firm a Belief of the Presence and Inspection of God, and as great a Reverence and Dread of Him, why should not these have the same Influence and Effect upon us? Let us then avoid the Hypocrisy of desiring to be thought better than we are, by endeavouring, to our utmost, to be as good as we would be thought to be, and, if possible, better. So shall we satisfy ourselves that we seek the Praise of God, more than the Praise of Men.

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HERE, before I proceed, I cannot but admire the Wisdom and Goodness of Almighty GOD, in implanting such a Passion in the Nature of Man, as Shame, to no other Use or Purpose, than I can imagine, than to restrain him from vicious and shameful Actions. A Passion I call it, because the Body, as in other Passions, suffers from it, and that in a peculiar manner; it causing a sudden Motion of the Blood to the outward Parts, especially to the Face, which is called Blushing, and a Dejection of the Eyes. If you ask me what Shame is, I answer, It is an ungrateful and afflictive Sense of Soul, proceeding from Dishonour. Now Dishonour is nothing else but Mens ill Opinion of me, or Dislike and Condemnation of my Actions, some way declared and manifested to me; which, why I should have such an Abhorrence of, and why it should be so grievous, and tormenting to me, there seems not to be a sufficient Ground and Foundation in the Nature of the Thing, supposing such as have this Opinion have neither Power nor Will to hurt my Body, but only in the Ordination of GOD, who hath so made our Natures, to secure our Innocency, and withhold us from the Commission of what is disgraceful and ignominious, as all sinful Actions, and none else, are.

AND as for secret Sins, I think Shame may take Place there too. It was a Precept of the Pythagoreans, Πάντων ὁμοῦ δεινὰ καὶ αἰσχρὰ  
 told Of

Of all Men reverence yourself most! Be ashamed to do that before yourself, which before others you would abhor, or blush to do; or otherwise you must suffer Dishonour from yourself, and condemn your own Actions, which will, in all reason, be more grievous and afflictive than the ill Opinion and Word of other Men. Hence, Conscience of Sin is esteemed a most painful and tormenting thing, by the generality of all Mankind, tho' no other Man be privy to it.

\* Daniel  
xii. 2.

BUT to return from whence we digressed, though \* Shame and everlasting Contempt shall, at the general Resurrection, be the Portion of them who persist and die in their Sins; yet a serious and unfeigned Repentance, attested by a holy Conversation for the future, is an effectual Means to deliver us from this Shame, whatever our former Sins have been. For, they shall not be produced against us; they shall not be objected to us at that Day; they shall be buried in eternal Silence and Oblivion, and be as tho' they had not been. And this Opinion I hold, 1. More agreeable to the Scripture, which in this Matter makes use of the Terms of hiding, and covering, and blotting out, and forgetting. *Psal. lxxxii. 1. Blessed is the Man whose Transgression is forgiven, and whose Sin is covered. Psal. cxlii. 2. I, even I am He, that blot out thy Transgressions, and will not remember thy Sins. Psal. li. 9. Hide Thy Face from my Sins, and blot*

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blot out all mine Iniquities. Jerem. xlviii. 34. I will forgive their Iniquity, and remember their Sin no more. Ezek. xxviii. 22. All his Transgressions that he hath committed, they shall not be mentioned unto him. Mic. vii. 19. Thou wilt cast all their Sins into the Depths of the Sea. And as it is more consonant to the Scripture, so is it, 2. More grateful and consolatory to the Penitents. For, the meer Mentioning and Reciting of their Sins before such an Assembly, must needs refresh their Shame and Sorrow, and so diminish their Happiness and Joy. To which I might add, that it is written, our Saviour at the last Judgment, in pronouncing the Sentence, shall enumerate the Good Works of the Godly to their Praise; but not a Word said of producing their Sins. I say, I hold this Opinion more probable upon these Accounts, than theirs, who affirm they shall then be published, for the magnifying and advancing, the declaring and illustrating the Mercy and Grace of God, in pardoning so great and heinous Offences.

AND truly, I do not know, but that the Sins of the Blessed may be blotted out, even of their own Memories. Some Philosophers, who were of Opinion, that Souls præ-exist before their Bodies, thought they were dip't in *Lethe*, which is a Fountain causing Oblivion, by means whereof they forgot whatever they had done before. This I look upon as a Dream,  
or

or Fancy: But, truly, I am inclinable sometimes to imagine, that the Soul of Man can hardly be entirely happy, unless it be as it were thus dipt in *Lethe*: For every sinful Action having a natural Turpitude in it, and being dishonourable, how can the Memory and Thought of it but beget such an ungrateful Passion as Shame, even to Eternity? And, what do Divines mean by saying, That the Action [of sinning] suddenly passes away, but the Stain and Blot of it remains; but that a vicious Action, even by them to whom it is pardoned, can never be thought of without Grief and Disturbance; it leaves an indelible Scar in the Soul, which can never be perfected, healed, and obliterated.

2. It concerns us much to live in all holy Conversation in this World, as we desire to avoid that Pain and Misery, which we shall otherwise most certainly be adjudged to at that Day: That *Indignation and Wrath, Tribulation and Anguish*, which God shall render to them *that do not obey the Truth, but obey Unrighteousness*, Rom. ii. 8. That *Worm that dieth not*, and that *Fire that is not quenched*, Mark ix. 44. and 46, and 48. That *outer Darkness, where is Weeping and Wailing, and Gnashing of Teeth*, Matt. viii. 12. and xxii. 13. and xxv. 30. That *Furnace of Fire*, Matt. xiii. 42, 50. That *Lake of Fire and Brimstone*, Rev. xx. 10. or of *Fire burning with Brimstone*, Rev. xix. 20. Which Places, tho' they be  
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not literally to be expounded, yet do they import at least a very sad and deplorable Estate, a high Degree of Torment and Anguish: And all this Eternal, and without Intermission, Night and Day. *These shall go into everlasting Punishment*, Matth. xxv. 46. The State of the Damned is supposed to be a State of absolute and complete Misery, made up of the Loss of the greatest Good, and a constant, fresh, and lively Apprehension of it, which Divines call *Pœna Damni*. And, 2. Excess of bodily Pain and Sufferings, and sad Distress and Trouble of Mind, occasioned by all manner of frightful Apprehensions, and vexatious Perturbations and Reflections, which they call *Pœna Sensûs*; and this without any Intermission or Hope of Deliverance eternally. *Jude vii.* it is called the *Vengeance of eternal Fire*. *Rev. xiv. 11.* *The Smoke of their Torment is said to ascend up for ever and ever.* And *Rev. xx. 10.* it is said of the Beast and false Prophet, that *they shall be tormented Night and Day for ever and ever.* If this be so, is it not our greatest Wisdom to use our utmost Diligence and Endeavour to avoid so deplorable a Condition, and to secure to ourselves an Interest in a future Estate of everlasting Bliss and Happiness, when this Life shall be ended?

BUT here the *Epicureans* and sensual Persons will be ready to object and argue, Here are Pleasures and Delights in this World,  
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which are very inviting and taking, and do highly gratify my Senses and Appetites. I hear likewise of future Rewards and Punishments for those that deny or fulfill their Carnal Lusts and Desires. These sensual Pleasures I see and taste, and feel, and am sure of, the other I do but only hear of, and therefore they do not, they cannot so strongly affect me: Were Heaven, and the Happiness thereof, set before my Eyes, and did I see it as plainly and clearly as I do these Things below, then indeed I should not need many Motives to provoke me to endeavour the Obtaining of it. But, alas! that is far above out of our Sight, the Joys of Heaven are by the Apostle termed Things not seen. Again, these outward and temporal Enjoyments are present and easily obtainable; the other at a great Distance, future, and besides, very hard to come by; and I love my Ease, *Ut est ingenium hominum à labore proclive ad libidinem*. Should I deny myself Good in this Life, and then perchance cease to be, and so have no Reward for my Pains; nay, on the contrary, expose myself to the Hazard of many Afflictions and Sufferings, which are the Portion of the Godly in this Life, how unnecessarily shall I make myself miserable? Miserable I say, because by the Apostle's own Confession, Christians, *if in this Life only they had Hope, would be of all Men the most miserable*, 1 Cor. xv. 19. Had I  
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not better make sure of what is before me? Why have I these Appetites within me, and such Objects about me, the one being so suitable to the other, is it not more natural and reasonable to fulfill, than deny them? Surely, it cannot be Wisdom to lose a certain Good, for an uncertain Hope; and for an ungrounded Fear of Hell hereafter, to undergo a Purgatory here.

TO this Argumentation upon the false Foundation of the Uncertainty of a future Estate of endless Happiness or Misery, accordingly as we have behaved ourselves in this Life, I answer,

THAT for the Futurity of such an Estate, we have the best Authority in the World, to wit, the Holy Scriptures, and universal Tradition.

I. THE Holy Scriptures, whose Authority to be more than humane, hath been by many so clearly and convincingly demonstrated, that I shall take it for granted, and not waste Time to prove it. The Testimonies herein contained, concerning eternal Happiness and Misery, are so clear and full, that it seems to me impossible, without manifest Distortion, to elude or evade the Force of them. Some we have already recited, and might produce many more, Isa. xxxiii. 14. *Who among us shall dwell with the devouring Fire? Who among us shall dwell with everlasting Burnings?* Dan. xii. 2. *And many of them that sleep in*

the Dust of the Earth shall awake, some to everlasting Life, and some to Shame and everlasting Contempt. 2 Thess. i. 9. *Who shall be punished with everlasting Destruction from the Presence of the LORD, &c.* speaking of them who know not GOD, and obey not the Gospel of our LORD JESUS CHRIST. *Isai. lxvi. 24. For their Worm shall not die, neither shall their Fire be quenched.*

THE Origenists, and others, that cannot be reconciled to the Catholick Doctrine of the Eternity of the Punishments of the Damned, make the Word αἰών, from which the *Latin ævum* is derived, to signify sometimes a determinate Time, as might (say they) easily be proved by many Examples, and so εἰς αἰῶνα, or αἰῶνας, which we translate for ever, signifies, when applied to this Matter, a long indeed, but yet a finite Time; and εἰς τὰς αἰῶνας τῶν αἰώνων, which we render for ever and ever, may likewise signify not an eternal Duration, but a Time to which some Term may be set by GOD, though to us unknown. In the same Sense they accept the Adjective αἰώνιος for a long, but finite Time. But I am of S. *Augustin's* Opinion, that αἰώνιος doth in the New Testament signify the same with *æternus* in *Latin*, and is appropriated to Things that have no End; and that εἰς τὰς αἰῶνας τῶν αἰώνων, for ever and ever, doth in like manner always denote eternal or endless Duration. That the Word αἰώνιος, when

when applied to the State of the Damned, doth signify *eternal*, S. Augustin well demonstrates from the *Antithesis* in that Place of *Matth. xxv. 46.* And these shall go away into everlasting Punishment, but the Righteous into Life eternal. Where it is in the same Sense attributed to that Life which is the Reward of the Righteous, and that Fire which is the Punishment of the Damned; there being no Reason to believe that the same Word in the same Verse, when applied to Opposites, should be taken in a different Sense. But by the Consent of all Christians it is granted, that the Life of the Blessed shall be eternal, therefore so must the Punishment of the Damned be too.

THIS Acception of the Word *aiōnios* for *eternal* or *endless*, when it refers to the State of those miserable Persons, receives a farther and strong Confirmation from the

SECOND Particular we proposed, that is, *Universal Tradition*: It being a received Opinion among the Heathen, which must needs descend down to them by Tradition from the Ancients, that Eternal Punishments awaited the Wicked after Death.

WHAT more common Notion among the Grecians and Romans, than of an *Elysium*, and *Tartarus*? the former to reward good Men, the latter to punish wicked. And those too esteemed to be Eternal States. Of this the *Epicurean* Poet *Lucretius* is a sufficient

## Of the Dissolution

cient and unexceptionable Witnesses: For he makes the Fear of these Punishments to be the Cause of all the Miseries of Humane Life, and the Foundation of all Religion.

*Æternas quoniam pœnas in morte timendum.*

NOW, that he could derive this from no other Source but Tradition, is clear; because he lived a good while before our Saviour's Time, and the Divulgate of the Scripture among the Heathen. And because it may be objected, that *Æternas* may signify only of long Continuance, to put the Matter out of all Doubt, in another Place he saith,

----- *Nam si nullum finem esse putarent  
Ærurnarum homines, nulla ratione valerent  
Relligionibus atque minis obsistere vatum.*

AND that this Opinion and Belief generally prevailed among the People before *Epicurus* his Time, the same *Lucretius* testifies in the Beginning of his first Book,

*Humana ante oculos sædè cum vita jaceret  
In terris oppressa gravi sub Relligione, &c.  
Primum Graius homo, &c.*

*Long time Men lay oppress'd with slavish Fear,  
Religion's Tyranny did domineer,  
Which being plac'd in Heav'n, look'd proudly  
down,  
And frighted abject Spirits at her Frown.*

At



*At last a mighty One of Greece began  
T'assert the Natural Liberty of Man,  
By senseless Terrors, and vain Fancy led  
To Slavery; streight the conquer'd Fantoms fled:*

for he makes (as we saw before) the Fear of eternal Pain and Misery, to be the Foundation of all Religion.

1. Now, because these Objectors do represent Religion to themselves and others as a melancholick and disconsolate Thing; and think and say, that those that enter into this State, must bid adieu to all the Pleasures of Sense, and taste no Sweetness in any worldly Object; I shall endeavour to remove this Prejudice. I say therefore, That our gracious God doth not envy us any real Good that the Creatures can afford us, and therefore hath not denied us a moderate Use and Fruition of any of them. And seeing He hath annexed Pleasure to those Actions that are necessary for the Support of Life, and Continuation of Kind, as a Bait to invite us to the Performance of them, it seems to me highly absurd and contradictory to affirm, that He hath forbidden us to partake or taste those Enjoyments which Himself has appointed as effectual Means for the Security of those great Ends; and which are so necessary Consequents of those Actions, that we cannot but partake them. Where the Appetite is eager, God hath indulged, I might say, commanded

a moderate and regular Satisfaction. And we know, nay, the Blindness of Atheism cannot deny, that the greatest Pleasure results from a moderate and well circumstantiated Use of Pleasures. *Voluptates commendat ravior usus.* Now a religious Man enjoys all the Pleasures of these worldly and sensible Goods, without any of the Pain which is annexed to the excessive and irregular Use, or indeed Abuse of them: And besides, his Pleasure is enhanced, in that he beholds and receives them as Blessings of GOD, and Tokens of His Favour and Affection, and is without all Fear of a future sad Reckoning for his Participation of them. Howbeit a Denial of ourselves for GOD'S Sake and Cause, in any thing which we might otherwise lawfully enjoy, though it be not commanded, yet is accepted, and shall be rewarded by Him.

OTHERS there are who grant, That these Words grammatically signify as we contend, and that eternal Punishments are indeed threatned to the Wicked; but say they, these Threatnings are intended only as *Terricula-menta*, or Bug-bears to Children, to terrify and keep People in Awe, and to preserve the World in some tolerable Condition of Quietness. And *Origen* himself, tho' he be of Opinion, that these Threatnings signify only temporary Pains; yet he saith, that such Mysteries are to be sealed up and concealed from the Vulgar, lest wicked Men should  
rush

rush into Sin with all Fury and Licentiousness, if this Bridle were taken off, who by the Opinion and Fear of eternal and endless Punishments can scarce be deterred and restrained from it.

To this I answer, 1. That it seems to me indecorous and unsuitable to the Person and Majesty of God, to make use of such sorry and weak Means to bring about his Ends, as grave Men can hardly condescend to. 2. I do not see how it can consist with his Veracity, in plain Terms absolutely to threaten and affirm what he never intends to do.

INDEED it is questionable, Whether it be allowable in Man; it being at best but an officious Lye; for it is a speaking what we do not think, and that with an Intention to deceive.

SECONDLY, I proceed now to a second Objection against the Eternity of the Pains and Sufferings of the Damned, and that is, its Inconsistency with the Justice of God. What Proportion can there be between a transient and temporary Act, and an eternal Punishment? The most rigid Justice can exact no more than a *Talio*, to suffer as I have done.

Ἐπεὶ πάθοι τὰ καὶ ἐπέξε δίκην δ' ἰσθιῖα γενοίτο.

If I have hurt, or grieved, or injured any Man, to be punished with the same, or an equivalent Suffering: If I have taken any  
unrea-

unreasonable Pleasure, to compensate it with an answerable Pain. Indeed, the Enormities of my Life cannot well deserve so much, if it be considered, that I have been strongly instigated and inclined, and as it were fatally driven upon all the Evils which I have committed, by those Affections and Appetites; which I made not for myself, but found in myself; and have been exposed to strong and almost inexpugnable Temptations from without; beset with Snares, encompassed about with innumerable Evils.

To this I answer, First, that every Sin, Injury, or Offence, is aggravated and enhanced by the Dignity or Merit of the Person against whom it is committed. So Parricide is esteemed a greater Crime than ordinary Murder, and by the Laws of all Nations avenged with a sorer Punishment. The like may be said of *Læsa Majestas*, or Treason. Now GOD is an infinite Person, and Sin being an Injury and Affront to Him, as being a Violation of His Law, an infinite Punishment must be due to it.

THIS Answer Dr. *Hammond* in his *Practical Catechism*, lib. 5. sect. 4. accounts a Nicety, and Unsatisfactory, as also that other common Answer, That if we should live infinitely, we would sin infinitely; and therefore gives us another, which in his Discourse of the Reasonableness of Christian Religion, he thus briefly sums up.

2. *That*

2. That the Choice being referred to us to take of the two which we best like, eternal Death set before us on the one hand, to make eternal Life the more infinitely reasonable for us to choose on the other hand, and the eternal Hell (whensoever we fall into it) being perfectly our own Act, neither forced on us by any absolute Decree of GOD, nor irresistible Temptation of the Devil or our own Flesh; but as truly our Wish and Choice, and mad Purchase, nay, much more truly and properly, than eternal Heaven is, (when our Obedience is first wrought by GOD's Grace, and yet after that so abundantly rewarded by the Doner) it is certain, if there be any thing irrational, it is in us unkind and perverse Creatures (so obstinate to choose what GOD so passionately warns us to take heed of; so wilfully to die, when GOD swears He wills not our Death) and not in Him, who hath done all that is imaginable to be done to reasonable Creatures (here in their Way or Course) to the Rescuing or Saving of us.

BUT to this may be replied, If the Thing itself be unjust, how can our Choosing of it make it just? Now, that it is unjust, appears, in that there is no Proportion between the Offence and the Penalty, that is, between a short and transient Act, and an eternal Punishment.

TO which I answer, That GOD deals with us as with intelligent Creatures, and that

that have Liberty of Will; and so are to be led by Motives to choose that which is good, and refuse that which is evil: And therefore, though there should be no Proportion between them, (as in the first Answer we have shewn there is) yet the Annexing such a Punishment to the Violation of His Laws may be just, because a lesser would not be a sufficient Motive to determine our Choice, and secure Obedience to them. As we see Lawgivers, in the Sanction of their Laws, are not so solicitous to make the Penalty commensurate to the Offence in Point of Duration, as that it be sufficient to enforce Obedience to the Law; not thinking it unjust to annex a Punishment much longer than the Offence, if a lesser will not serve to secure Obedience. So several other Crimes besides Murder are punished with Death, which is a kind of eternal Punishment, there being no Return to Life again; And those Laws only are unjust upon account of disproportionate Punishments, where lesser would serve the Turn.

Now, that lesser than eternal Punishments would not suffice to enforce Obedience to God's Commandments, is clear in Experience: And *Origen* himself, the first Broacher of the Opinion of the Determination of the Damned's Punishments, could not but confess it, in that he saith, It is to be held as a great Secret, and carefully concealed from the

the Knowledge of the Common People, who, if you take off this Bridle, would be apt to rush into Sin, as a Horse rusheth into the Battle. Indeed Eternity is the very Sting of Hell. Bate him but that, and the Sinner will not think it very terrible or insupportable. But the Thought of an eternal Hell intervening, (and it will often intrude itself) strikes a cold Damp to his very Heart, in the midst of all his Jollities, and will much qualify and allay all his Pleasures and Enjoyments. Rid him of this Fear, and he will be apt to despise Hell and all his Torments, be they never so grievous or lasting. He will be ready thereupon thus to argue with himself: What need I take so much Pains to strive against Sin? What need I swim against the Stream, stem the Tide of my Passions, my natural Appetites and Inclinations, and resist the Importunities of Company? What need I keep such a constant Watch and Ward against my spiritual Enemies the Devil, the World, and the Flesh? If I fall into Hell at last, that's no eternal State, it lasteth but for a time, and will come to an End. I'll venture it, I hope I shall make a Shift to rub through as well as others.

THIS, therefore, I think is the most solid and satisfactory Answer to that grand Objection against the Justice of God in punishing a short and temporary Offence with  
eternal

eternal Pains and Sufferings, because lesser are not sufficient to enforce Obedience to His Laws.

If any Man be dissatisfied with the precedent Answers, all that I have to add farther, is, that before this Sentence adjudging to eternal Death be pronounced against him, and executed upon him, there shall be such a Revelation made, as shall convince and satisfy him of the Righteousness thereof. And this the Apostle seems to intimate, *Rom. ii. 5.* when he calls the Great Day of Doom, the Day of the Revelation of the righteous Judgment of GOD. Then shall be made appear what now to our dim-sighted Reason is not penetrable; how the Justice of GOD can consist with the eternal Damnation of the Wicked.

As for Man's being as it were fatally determined to Evil by the Strength of Temptation, and the Violence of unruly and headstrong Passions and Appetites: I answer, That there are Motives and Considerations sufficient to enable a Man to resist and repell, to conquer and overcome the most alluring and fascinating Temptations, the most urging and importunate Appetites or Affections; such are, certain Shame and Disgrace; and that not long to come, eternal Infamy and Dishonour; present Death, strong Fear and Dread of approaching Death, or sad and intolerable Pains or Calamities. Now the



the Divine Threatnings are of the greatest and most formidable Evils and Miseries that humane Nature is capable of suffering; and therefore were they but firmly believed and apprehended, they would be of Force sufficient to stir up in us such strong Passions of Fear and Terror, as would easily chase away all Temptations, and embitter all the Baits of sensual Pleasure.

3. THERE remains yet a third Objection against an eternal Hell, and that is, that it is inconsistent with the Divine Goodness. For the Unbeliever will say, It's contrary to all the Notions and *Ideas* I have of God, to conceive Him to be so angry and furious a Being. How can it stand with Infinite Goodness, to make a Creature that he fore-knew would be eternally miserable? We Men account it a Piece of Goodness to pardon Offences: And all Punishments are intended either for the Reformation and Amendment of the Offender, or, if he be unreclaimable, to prevent the Mischief which he might otherwise do, or for an Example to others to deterr them from the like Enormities; but I do not see for what such End any Man can be eternally tormented. So that of such Inflictions one may rationally demand, *Cui bono?* What Good comes of them? How then can they come from God, who by all Mens Confession is infinitely Good?

To

To which I answer : *First*, That God is just as well as good. You will say, What is Justice ? It is an equal Weighing of Actions, and Rendring to every one his Right or Due : A Setting streight again what was perverted by the Sins and Extravagancies of Men. Now, that the Breaking of Order and Equality in the World, this Usurping and Encroaching upon others Rights, is a great Evil, and ought to be rectified, some may take an Argument from the strong Inclination and Desire to revenge Injuries, that is implanted in the Nature of Man, and of all Creatures. You'll say, all Desire of Revenge is absolutely sinful and unlawful. I answer, I am no Patron of Revenge. I know, the very *Heathen*, by the Light of Nature, condemned it.

----- *Infirmi est animi exiguique voluptas;*  
*Ultio* -----

*Revenge is the Pleasure of a poor and weak Spirit.* Yet, let us hear what they have to say. 1. It is hard to affirm, that any innate Appetite or Desire is in itself simply and absolutely, and in all Circumstances whatsoever, unlawful ; for this seems to reflect upon the Author of Nature.

To which may be answered, that a well circumstantiated Desire of Revenge may not be in itself unlawful, yet for the evil Consequents of it, it may be, and is prohibited by a positive Law. 2. Divine Persons have  
 prayed

prayed to God to avenge them, as *David* and the Prophets. And *S. Paul* himself, *2 Tim.* iv. 14. prays *GOD* to reward *Alexander the Coppersmith* according to his Works. To which may be answered, That those Expressions are rather Predictions of what should befall their Enemies, than Desires that they might. Again, whereas it is said, *Rev. vi.* 9, 10. *That the Souls of them, under the Altar, that were slain for the Word of GOD, and the Testimony which they held, cried with a loud Voice, saying, How long, O LORD, Holy and True, dost Thou not judge and avenge our Blood on them that dwell on the Earth?* Dr. *Hammond* saith, It signifies no more, than that their Blood cries to God for Vengeance, as *Abel's* is said to do. 3. The Nature of Forgiveness seems to imply the Lawfulness of some Desire of Revenge. For what is Forgiveness, but a Parting with, and a Renouncing the Right I have to be Avenged; and, therefore, before I Forgive, I do retain at least some Will to be Revenged. And, I am not obliged by our Saviour, to Forgive absolutely, but upon Condition of Repentance. *Luke xvii.* 3, 4. *If thy Brother sin against thee, rebuke him; and if he repent, forgive him, &c.* And in the *LORD's* Prayer, one-Petition is, *Forgive us our Trespases, as we forgive them that trespass against us.* But *GOD* forgives not without Repentance. To which may be answered, That

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before

before his Repentance, I may retain a Will of having an Offender punished by the Magistrate, or by GOD, for his own Good and Reformation, but with no respect of avenging what is past. And if his Repentance prevents his Punishment, then I am to forgive him, that is, cease to desire his Punishment. But all allow Vengeance to be just in GOD, whose Actions are not to be scanned by our Measures. He hath not permitted Vengeance to us, but hath reserved it to Himself. *Vengeance is Mine, (saith the LORD) and I will repay.*

2. IF it be just with GOD to propose to us such a Choice as Heaven, upon Condition of our Obedience to His Law, or Hell in case of Disobedience, as, we see, some wise Men make no Scruple to grant; then it cannot be Injustice in Him to inflict the Punishments of Hell upon them that make it their Choice. Nay, I cannot see how it can consist with His Veracity not to do it: Why then should any Argument from His Goodness move us to distrust His Veracity? as I have before intimated. It may also be answered to the Demand, *Cui bono?* That these eternal Punishments were threatned for a very great Good, viz. to secure Obedience to the Divine Laws, and to restrain Men from sinning.

IT may be objected against the Goodness of GOD, and His *Philanthropy*, or Love to Man-

Mankind, How can it consist therewith, to permit Sin to enter into the World? Why did He not prevent it, and make it impossible it should enter, since He hath Wisdom enough, and Power enough, to prevent it? that I may use Dr. *Whichcot's* Words, [*Sermons, Vol. II. Sermon. V.*]

To which I answer; Why might not God make a Creature, endued with a Faculty of Understanding, to discern that which is Good, and Freedom of Will to make Choice of it, and under no Necessity of Sinning? If He may, and hath made such an one, it doth necessarily follow, unless He frustrates His own Workmanship, that He must suffer it to act according to its own Will. Indeed, without this Freedom of Choice, there can be no such thing as Vertue or Vice. For, how can that be a vertuous Action to which the Agent is as necessarily determined, as a Stone to fall downward.

BUT farther to vindicate the Honour of our Maker, (*saieth the forementioned Dr. Whichcot*) and to put all out of Doubt, all those things considered which are the Provision of God, Man is more sufficient to His Effect, and the Purposes of His Creation, than any other Creature whatsoever. For as that to which a Man is called and required, is of a higher Nature than that of any other Creature below him; so also are his Principles higher and nobler; and there is over  
G g 2 and

and above these, the Assistance of Grace; which is supernatural, and more than is due to him. This is such an Assistance as is able to raise a Man to that which is supernatural, and to fit him for the State of Glory. You see, inferiour Nature is sufficient to its End, and hath not failed, and we are confident that it will not fail. Now, why a Man that is invested with nobler Principles should not act at a higher rate, according to those Principles and Endowments, is a thing not to be answered. But to return from whence I have digressed.

I AM as unwilling as any Man to limit the Mercies of GOD, because I have as much need of them as any Man: Yet I must refer it to Him, whether He will be more favourable than He hath threatned; or no, whether He will remit something of the Severity of His Comminations. I am also willing to restrain and confine the Sense of these Words, *αἰῶνες*, and *αἰῶνες αἰῶνων*, as far as the Context will permit. But let our Opinions and Hopes of the Mercies of GOD, and temporary Hell, be what they will; a temporary Hell, I say, or rather a *Purgatory*, instead of Hell: For the Word *Hell*, according to the usual Acception of it, includes Eternity.

I SHALL add farther, That since GOD hath threatned eternal Punishments, and it is no Injustice in Him to inflict them upon the

the Breakers of His Laws; and, since we can scarce reconcile it with His Veracity not to do so, it is our wisest and safest Course to believe them. For, though He should not intend to execute the Severity of them upon us, as we may groundlessly imagine; yet it is clear, that He would have them be believed by us, else they cannot have that End and Effect He designed them to: And, therefore, it must be Unbelief and Presumption in us to deny or distrust them, tho' upon Supposition, that they are irreconcilable with His Goodness; with which, yet, perhaps, they may accord well enough, tho' we cannot at present discern it. All Divine Revelations are to be believed and accepted by us, as well Threatnings as Promises; and, if we may distrust the Veracity of God in Them, I know not but we may as well do it in These: If we deny the Eternity of the Torments of Hell, I do not see but that we may, upon as good grounds, with *Origen*, deny the Eternity of the Joys of Heaven.

LET not then the Presumption of a temporary Hell encourage thee to go on in Sin: For, how if thou shouldst find thyself mistaken? If the Event frustrate thy Hopes, and fall out contrary to thy Expectation, as it is most likely it will, What a sad Case wilt thou be in then? How will the Unexpectedness thereof double thy Misery? *Im-*

†

*provisa*

*provisa grāvius feriunt.* How wilt thou be stricken, as it were; with a Thunderbolt; when the Almighty Judge shall fulminate against thee a dreadful indeed, but by thee formerly undreaded; Sentence; adjudging thee to endless Punishments? How wilt thou damn thine own Credulity, who by a groundless Belief of a temporary-Hell, hast precipitated thyself into an eternal; which otherwise thou mightest possibly have avoided?

WELL, but suppose there be some Shadow of Hope of the Determination of the Punishments of the Damned; it is by all acknowledged to be a great Piece of Folly; to leave Matters of the highest Moment, and which most nearly concern us, at Uncertainties; and a Point of Wisdom, to secure the Main Chance, and to be provided against the worst that can come. An eternal Heaven, or State of complete Happiness, is the Main Chance, and is not to come into any Competition, or so much as to be put into the Balance against a few short, transient, sordid, loathed; and; for the most part, upon their own account, repented Pleasures: To secure to ourselves an Interest in such a State, is our greatest Wisdom. And as for being provided against the worst that may or can come; What can be worse than an eternal Hell? Which there is, I do not say



say a Possibility, but the greatest Probability imaginable, that it will be our Portion, if we persist in Impenitency, and die in our Sins. But suppose the best should happen that we can hope or conceive, that Hell should last only *εἰς αἰῶνας αἰώνων*, for *Ages of Ages*, and at last determine: Do we think this a small Matter? If we do, it is for Want of Consideration and Experience of Acute Pains. Should any of us be under the Sense and Suffering of a raging Paroxysm of the Stone, or Gout, or Colick, I doubt not but rather than endure it for Ten thousand Years, he would willingly part with all his Expectation of a Blessed Estate after that Term were expired, yea, and his Being to boot. But, what are any of these Pains to the Torments and Perpetuities of Hell? or, the Duration of Ten thousand Years to those Ages of Ages? If thou makest light of all this, and nothing can restrain thee from Sin, but the Eternity of Punishment, thou art bound to thank God, who hath used this only effectual Means, threatening an eternal Hell. And it ill becomes thee to complain of His Rigour and Severity, who wouldst have made so pernicious an Use of His Lenity and Goodness. But thou who hast entertained such an Opinion, and abused it, to encourage thyself to go on in thy Sins, though others

others should escape with a temporary Punishment, surely thou hast no Reason to expect any milder Doom than to be sentenced to an eternal.



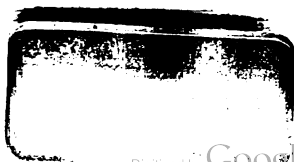
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